Heating Piping & Air Conditioning

NOVEMBER 1957

Single copy price 75c

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INDUSTRIAL • COMMERCIAL • INSTITUTIONAL • PUBLIC BUILDINGS

American Society of Heating and Air-Conditioning Engineers Journal Section—page 163

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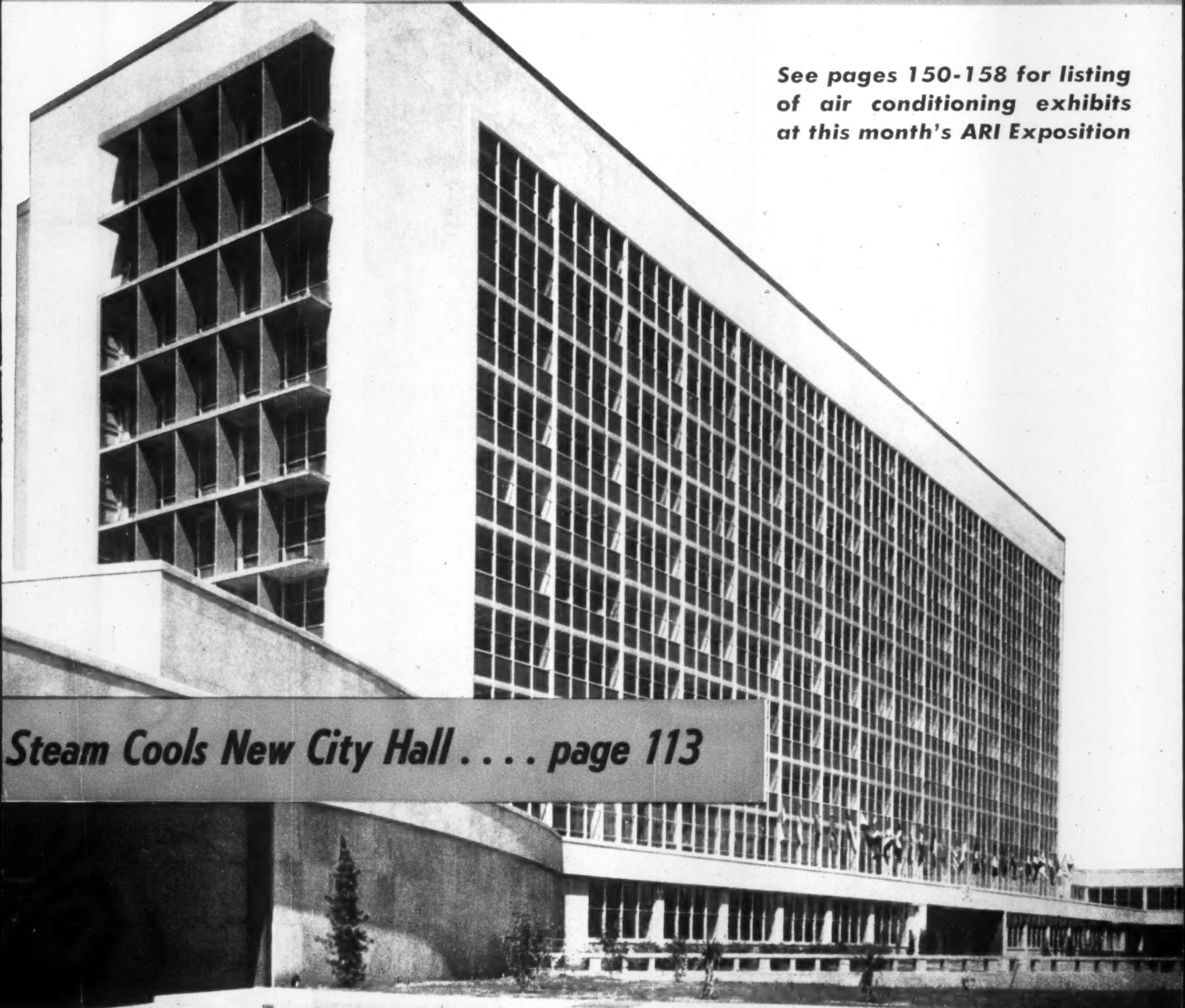

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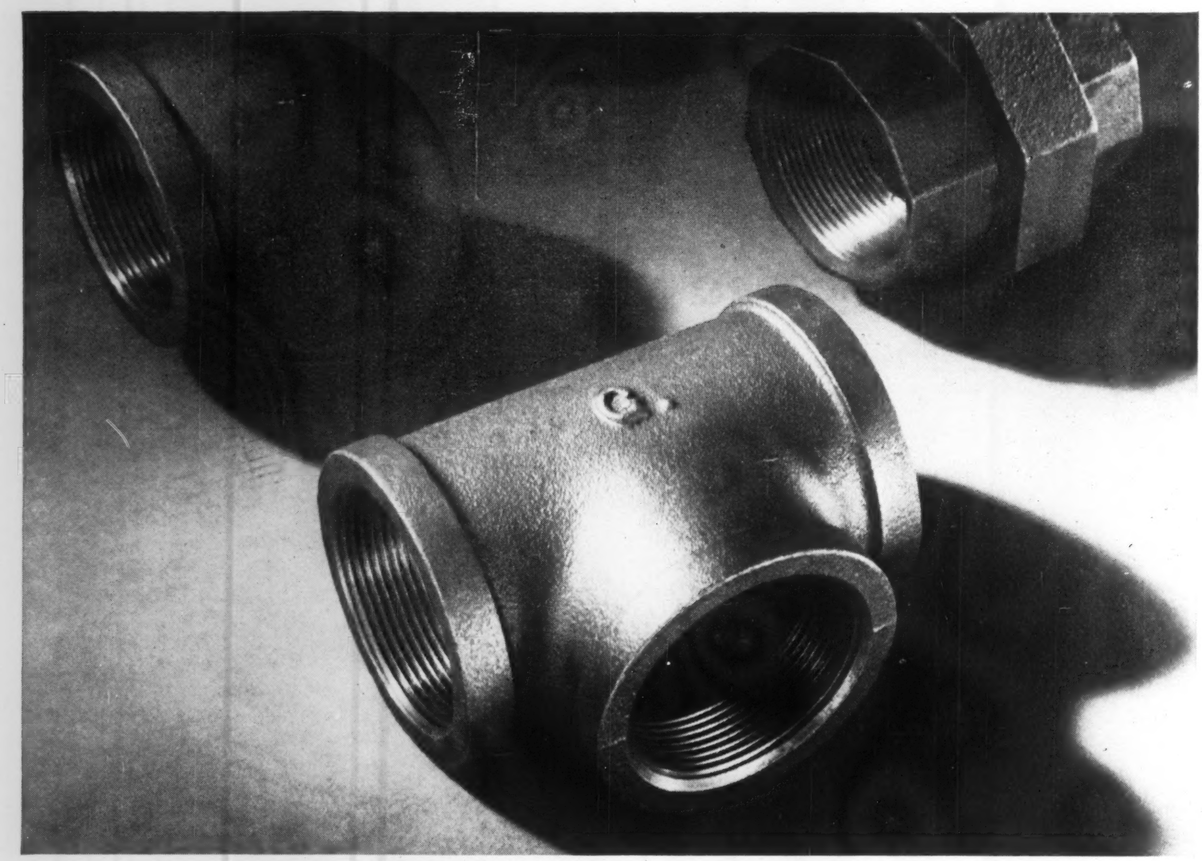

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from foundry to finished fitting – modern inspection methods insure the quality of

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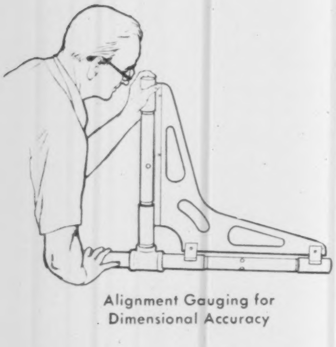

Alignment Gauging for Dimensional Accuracy

For instance, for malleable fittings, laboratory technicians make an hourly chemical analysis of foundry metal to insure uniform, high quality. Daily tests by photo-micrograph reveal metal structures. Sample bars from each melt are subjected to tensile strength tests. Grinnell quality control also includes alignment tests, pressure tests, thread gauging and comparator checks on the accuracy of threads and chamfer, in addition to visual inspection.

To make fittings the safest, strongest link in your piping system . . . choose from the wide Grinnell line of cast iron and malleable iron fittings; also bronze-to-iron unions. Look for the raised "G" when you buy.

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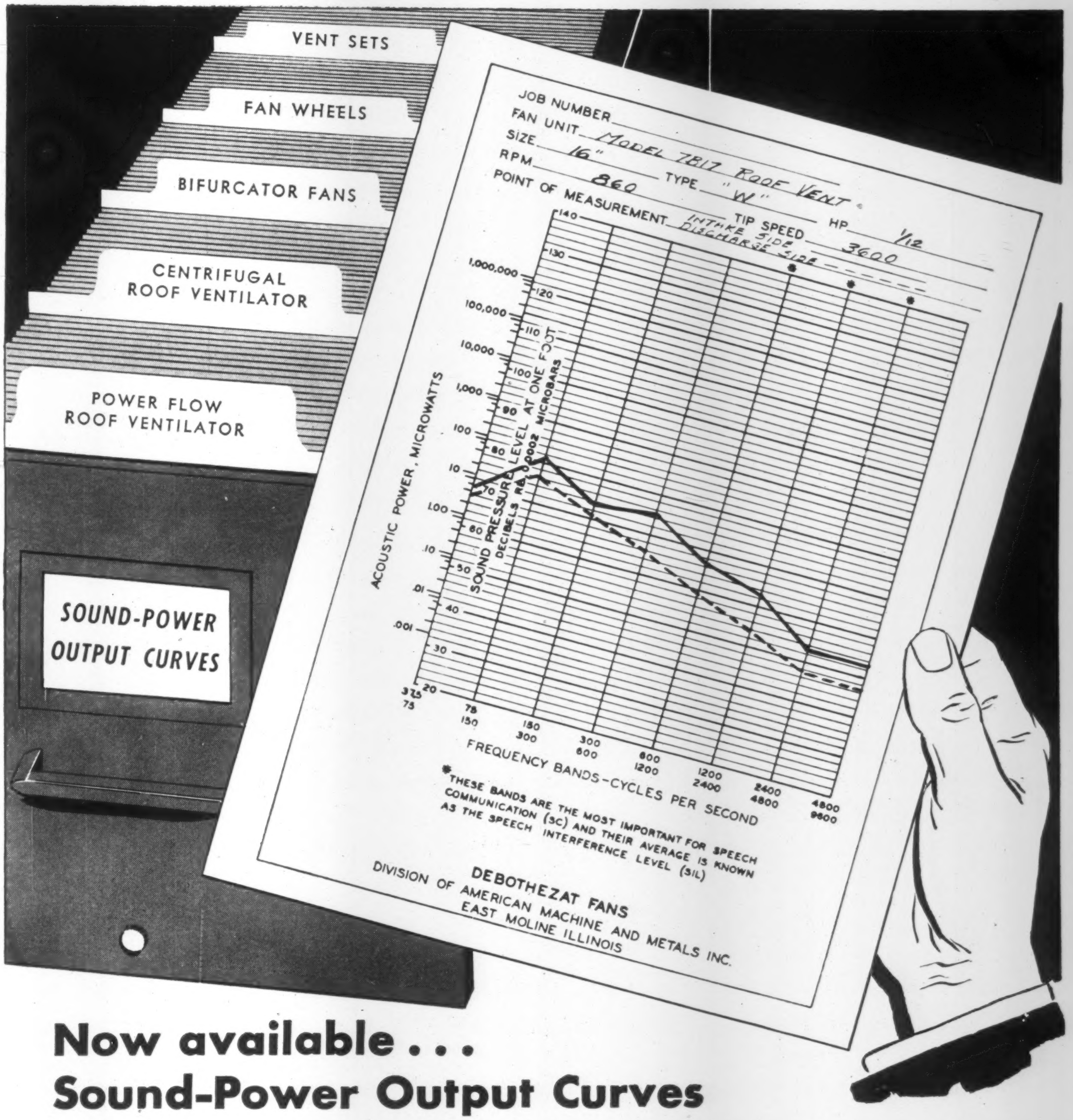
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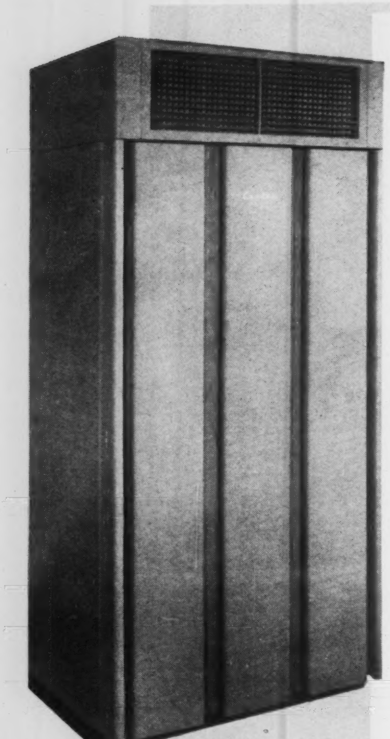

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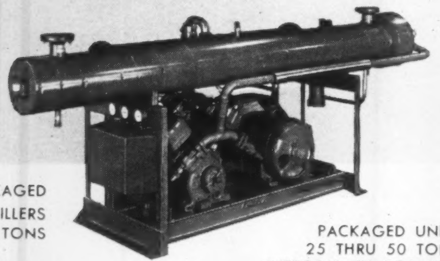

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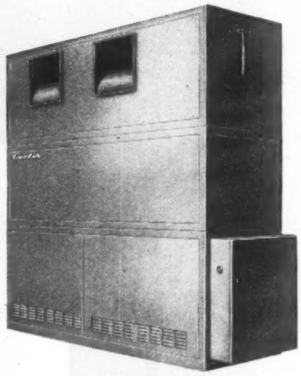

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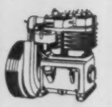

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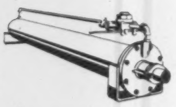

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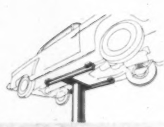

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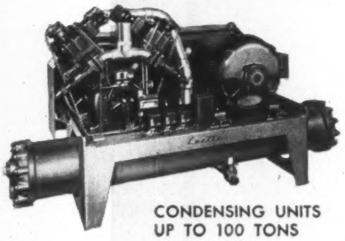

CONDENSING UNITS
UP TO 100 TONS

Heating Piping & Air Conditioning

Vol. 29 No. 11

(With which is merged the Aerologist)

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Why a Steam Trap Has to Handle "Air"

Low temperatures and corrosion of equipment are often evidence of inadequate trap air venting capacity

Air, with its load of oxygen and carbon dioxide, has an unwholesome habit of interfering with the efficiency of steam heated units. If steam were always free of these undesirable companions, things would be a lot simpler for men-who-operate-plants. Because it isn't, three unhappy situations frequently occur:

1. ***Operating temperatures are subnormal.*** This is a two-part problem. First, an air-steam mixture has a lower temperature than pure steam at the same pressure—see Table A. Secondly, air can "plate out" on heat transfer surfaces as shown in Figure 1. Under some conditions, such an air film will knock down heat transfer efficiency by as much as 50%.

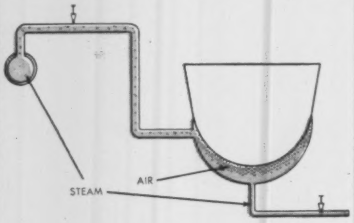


Fig. 1. *How air can "plate out" on heat transfer surfaces. This "insulation" drastically reduces heat transfer efficiency. Armstrong trap operation creates turbulence in the equipment that prevents this.*

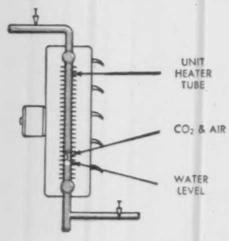


Fig. 2. *Corrosion occurs when units are not kept continuously free of both condensate and air. Armstrong traps discharge both,* at steam temperature, *as fast as they accumulate.*

2. ***Corrosion rears its ugly head.*** Oxygen and carbon dioxide are real trouble-makers. CO_2 gas goes into solution in condensate, forms carbonic acid and chews away at vulnerable metal sections. O_2 aggravates the situation. See Figure 2.

TABLE A—How air reduces steam temperature.

Gauge Pressure	Temp. of Steam with No Air Present	Temp. of Steam Mixed With Various Amounts of Air (% Air by Volume)	
		10%	30%
10.3	240.1	234.3	220.9
25.3	267.3	261.0	246.4
50.3	298.0	291.0	275.1
75.3	320.3	312.9	295.9
100.3	338.1	330.3	312.4

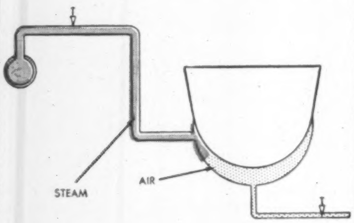


Fig. 3. *When steam is turned on, it takes a trap with extra air venting capacity to provide fast heat-up.*

3. ***Heat-up is slow as a snail.*** Air has a picnic in units that are shut off periodically. Figure 3 pictures the problem. Lines and equipment literally fill up with air. When the steam is turned on it can get in only as fast as the air gets out.

Enter Steam Traps

Curing these steam system ailments involves an operation sometimes called a "trap transplant." It consists of removing traps that don't get the air out and replacing them with traps that do.

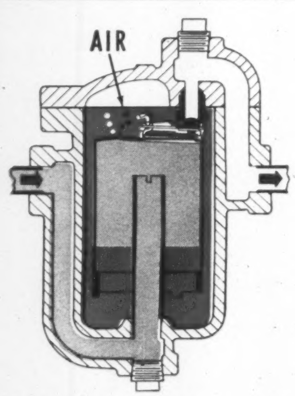
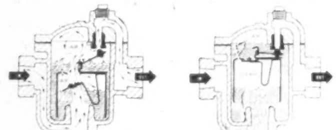


Fig. 4. *Air entering an Armstrong trap passes through the bucket vent and accumulates in the top of trap. When trap opens, air is discharged along with condensate.*

Figure 4 shows how an Armstrong inverted bucket trap continuously vents air. What the picture doesn't show is a built-in plus-value of this trap's design. An Armstrong trap opens suddenly, creating a momentary pressure drop and turbulence in the unit being drained. This breaks up air films and "pumps" air down to the trap so it can be vented.

The vents in standard Armstrong trap buckets will pass all the air normally encountered. In special cases, such as paper machine dryers, the vents are correctly sized larger at the factory to meet the requirement.



Thermostatic vent open. *Thermostatic vent closed.*

Fig. 5. *Open float with thermostatic vent for off-and-on units. When trap is cold, vent is open, permitting air to blow through when steam is turned on. When steam reaches trap, heat closes thermostatic vent. Then, regular bucket vent handles all air coming in with steam.*

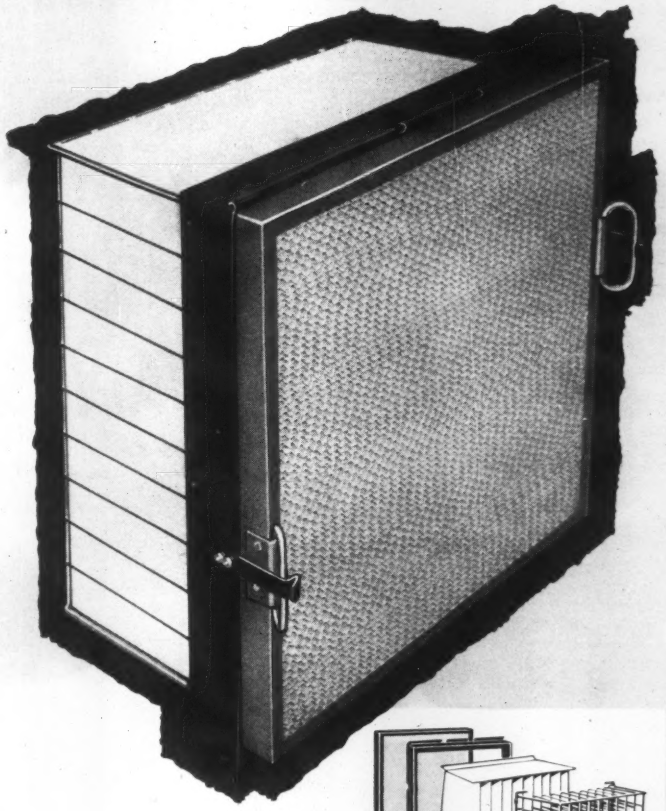
Open Float with Thermostatic Vent

Super air-venting capacity is a must for fast heat-up of low pressure unit heaters, heating coils, steam headers and other units that are on-and-off. Figure 5 shows how the Armstrong open-float-with-thermostatic-vent trap takes care of this.

* * *

The 44-page Armstrong steam trap book covers other features of the Armstrong trap as well as its excellent air handling characteristics. This catalog also discusses trap selection, installation and maintenance Your local Armstrong Representative or Distributor will be glad to give you a copy. Call him, or write Armstrong Machine Works, 8742 Maple Street, Three Rivers, Michigan.

ARMSTRONG STEAM TRAPS



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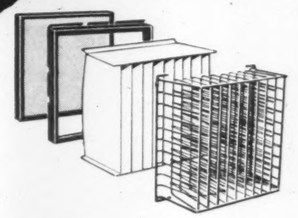

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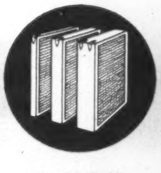

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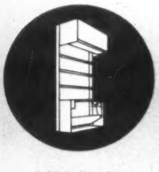

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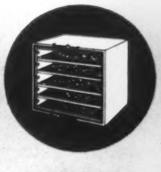

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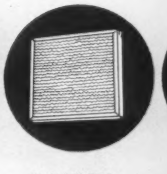

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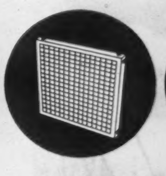

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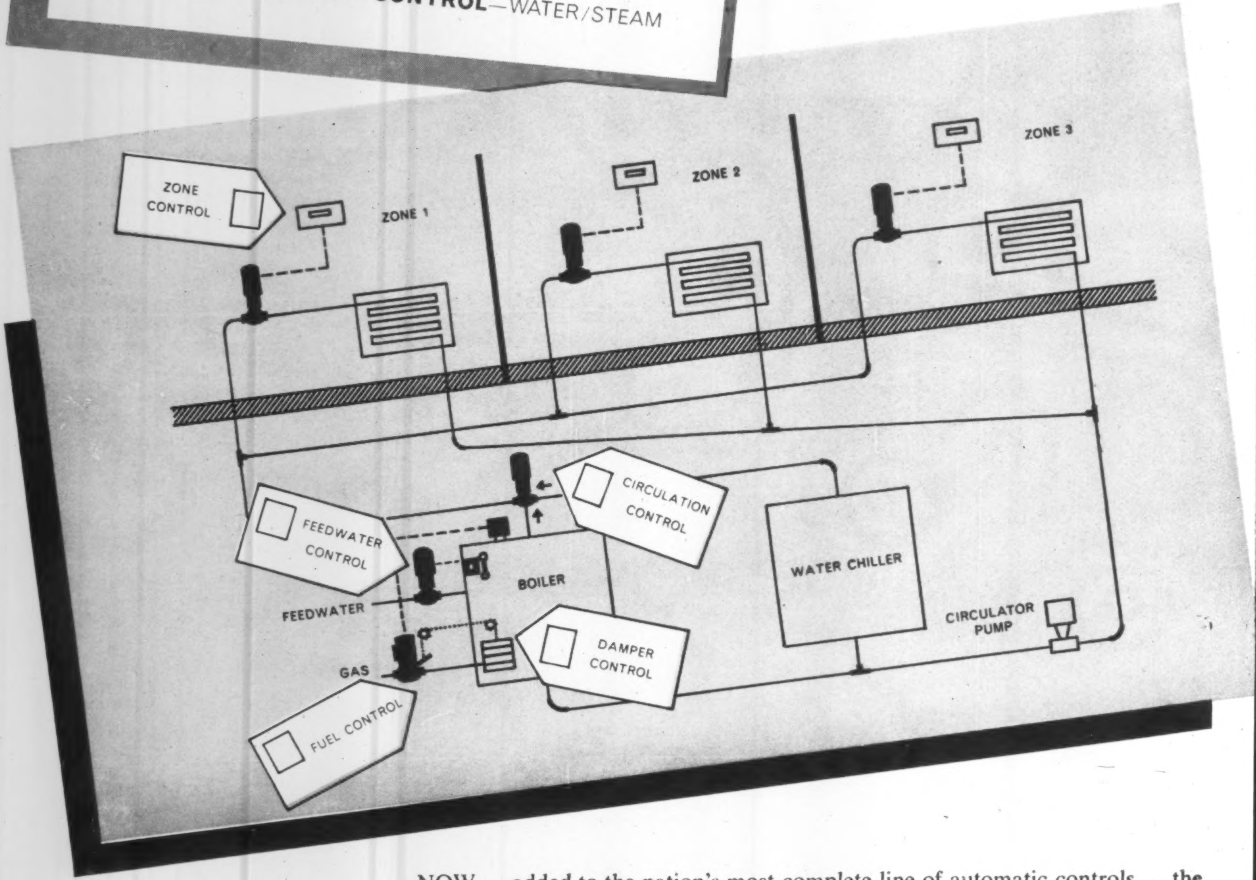
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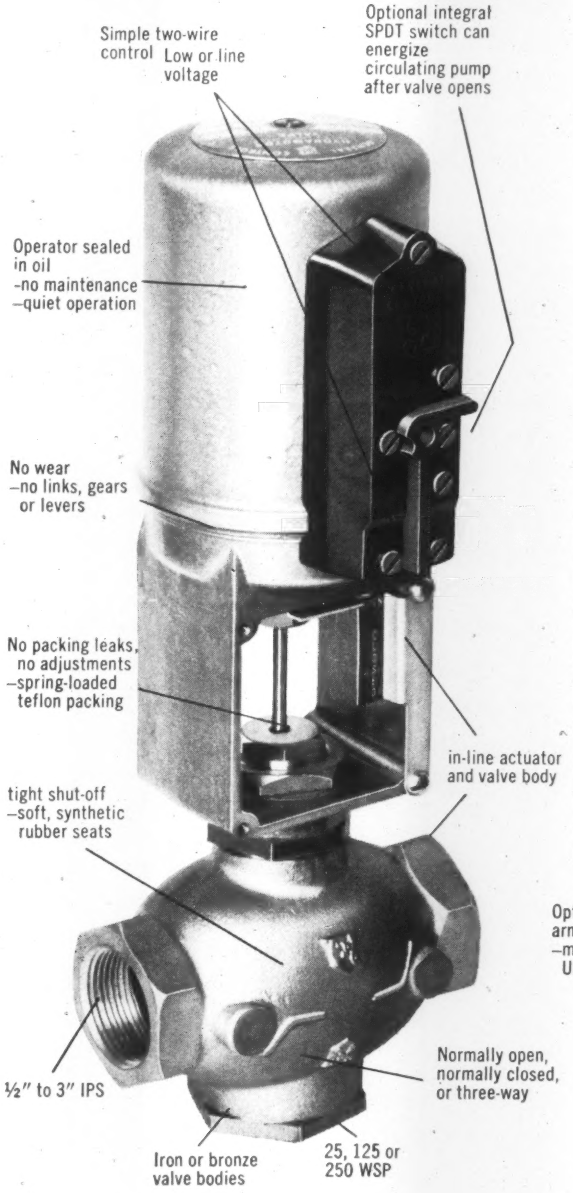
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-soft, synthetic rubber seats
Normally open, normally closed, or three-way
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Iron or bronze valve bodies
25, 125 or 250 WSP

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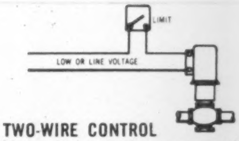
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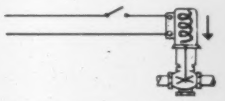

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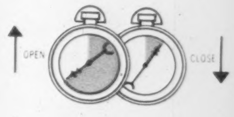

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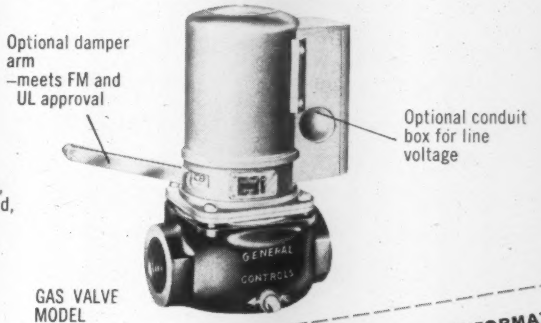
SLOW (10 or 40 sec.) OPENING with FAST (5 sec.) CLOSING for safe, sure ignition on high volume gas burners . . . fast shut-down in response to safety controls.
SLOW (10 to 40 sec.) OPENING with FAST (5 sec.) or SLOW (40 sec.) CLOSING. Slow closing eliminates damaging and annoying water hammer.


Optional damper arm
-meets FM and UL approval
Optional conduit box for line voltage
GENERAL CONTROLS

GAS VALVE MODEL

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GENERAL CONTROLS
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Please rush free copy of your new catalog on the H-O Series Hydramotor to:

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America's Finest Automatic Controls for Home, Industry, and the Military

40 Factory Branch Offices
Serving the United States and Canada

No. 4 of a series

"I've found continuous pure air:

Kathabar® systems kill over 97% of micro-organisms in large volumes of air !"

Because bacteria are killed by the chemical absorbent in a Kathabar system, it was long suspected that air passed through this system should be relatively free of bacteria. Proof of this theory would be of vital importance wherever airborne organisms contaminate humans or products.

To check this hunch, Surface asked a university research staff to conduct a series of exhaustive tests.

research proof

The conclusion of the research staff is that 97% of all micro-organisms (both pathogenic and non-pathogenic) are removed from air which passes through a standard Kathabar unit.

More tests are being continued in several industries with varying conditions. For example, one project is underway to test the Kathabar system's effectiveness in hospital operating rooms; and another in brewery fermentation cellars.

what does it mean?

Current research results indicate that air purification—long desired by many industries and institutions—can be as feasible and simple as purification of drinking water.

The system's advantages for hospitals show the significance of these findings. It provides the first continuous source of pure air. The liquid sorbent is not affected by the organisms it kills. Neither is it affected by intermittent minor dilution. It is equally effective with any volume of air you require.

The system also provides practical, year-round humidity control. It will humidify in the winter; dehumidify in the summer.

dry, clean coils

Where refrigeration is included in a Kathabar system, coils are kept dry and clean—eliminating a favorable breeding spot for bacteria and molds.

Further advantages of the system seem apparent. For example, it may permit recirculation of air for operating, delivery, cystoscopic, and fracture rooms. Eliminating the need for all-fresh air would reduce both the first cost and operating cost of a Kathabar air conditioning system.

benefits for other industries

Hospitals, of course, are not alone in their need for continuous pure air. Direct and immediate benefits can be realized in other fields, too, such as foods, pharmaceuticals, beverages, clinics, laboratories, and public buildings.

Even where pure air is not a primary factor, it is an important added benefit. Examples are drying operations, storage, testing, comfort applications.

who uses Kathabar systems

Kathabar systems make profits out of air for these industries:

Atomic Energy
Breweries
Cake Mix
Candy
Cellophane
Cellulose
Cereals
Chemicals
Coffee
Comfort
Compressors
Cookies
Electronics
Explosives
Film
Foundries
Gelatin
Glass
Glue
Gum
Hospitals
Hotels
Lacquer
Lenses
Machining
Matches
Marine
Meat
Offices
Ordnance
Paper
Pharmaceuticals
Plastics
Printing
Rockets
Rubber
Shellac
Sugar
Sanitaryware
Testing
Textiles
Transformers
Transistors
Vacuum Tubes
Varnish
Waterworks
Wire
Yeast

how they use Kathabar systems

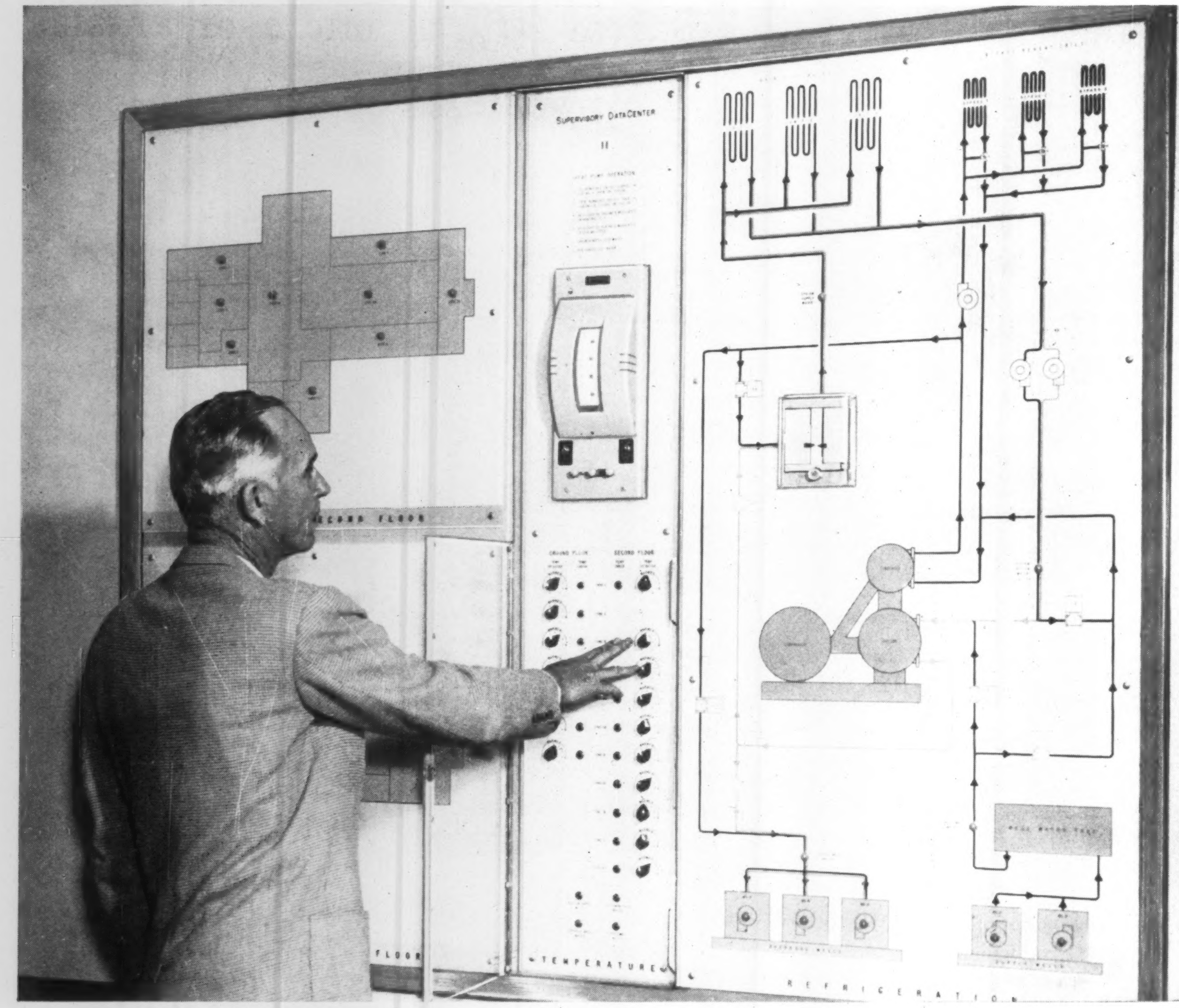
Many of these industries are now discovering the benefits of air sterilization by Kathabar systems. Others use them to (1) maintain spaces at 80 F and 55% RH or lower; (2) obtain continuous air at sub-freezing dry bulbs and dew points; (3) eliminate condensation; and (4) improve drying processes.

send description of your problem

Air Conditioning and Drying Division
SURFACE COMBUSTION CORPORATION
2384 Dorr Street Toledo 1, Ohio

Cereal
bread

Kathabar systems by **Surface**



True Automatic Air Conditioning—

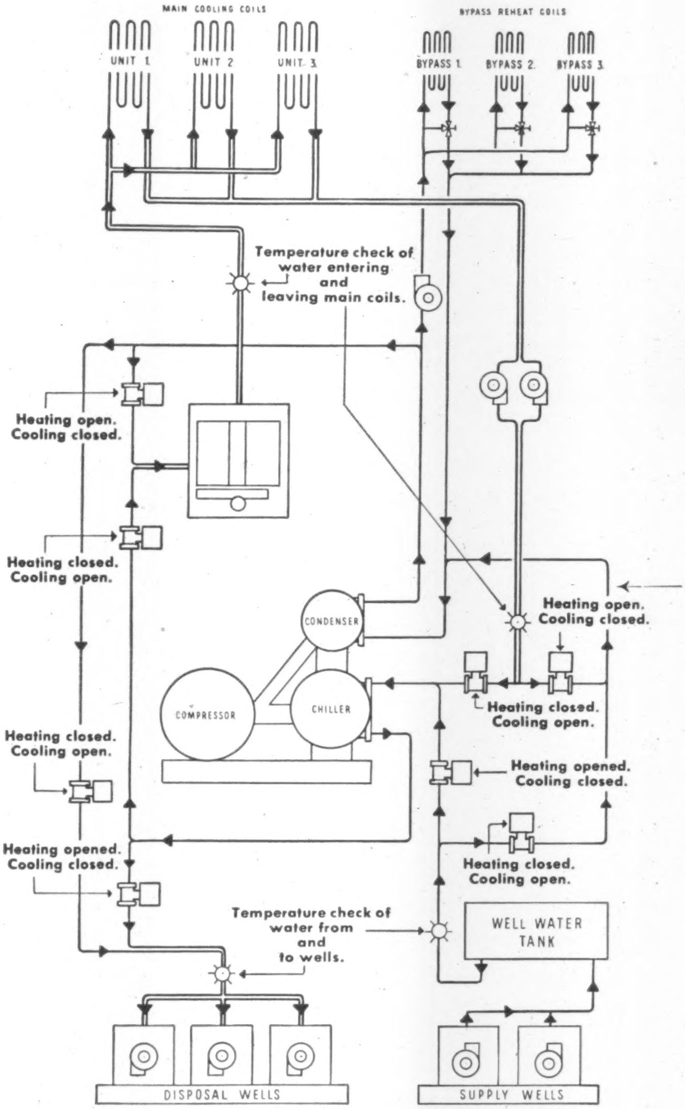
INSTALLATION of the Honeywell Supervisory DataCenter in the new Tampa Electric Company building lobby illustrates well how central control can be used with a 200-ton centrifugal refrigerating system that furnishes both heating and cooling.

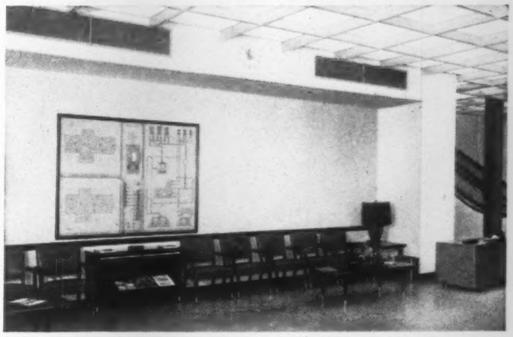
Temperatures in 17 large public zones can be read and adjusted quickly at the panel; a locked glass cover prevents tampering.

Individual room thermostats in private offices give each occupant personal temperature selection.

In addition, operation of the entire heat pump system can be checked at any time at the panel. A miniature instrument allows output of the refrigeration compressor to be noted and adjusted.

Architect: Eliot C. Fletcher, Tampa;
Engineer and General Contractor:
Stone & Webster Engineering Corporation of Boston;
Air Conditioning Contractor:
Tampa Armature Works, Inc., Tampa


MAIN COOLING COILS
UNIT 1
UNIT 2
UNIT 3
BYPASS REHEAT COILS
BYPASS 1
BYPASS 2
BYPASS 3
Temperature check of water entering and leaving main coils.
Heating open. Cooling closed.
Heating closed. Cooling open.
CONDENSER
COMPRESSOR
CHILLER
Heating open. Cooling closed.
Heating closed. Cooling open.
Heating closed. Cooling open.
Heating opened. Cooling closed.
Heating opened. Cooling closed.
Heating closed. Cooling open.
Temperature check of water from and to wells.
WELL WATER TANK
DISPOSAL WELLS
SUPPLY WELLS



New use for electric power—heating and cooling with a heat pump—is demonstrated dramatically by prominent display of the Supervisory DataCenter control panel in the lobby of the Tampa Electric Company building.

Heat pump operation. Tampa Electric Company heat pump system has three water circuits. (1) A circuit from the supply wells through the chiller (heating cycle) or condenser (cooling cycle) to the disposal wells. (2) A closed circuit from the main cooling coil to the condenser (heating cycle) or the chiller (cooling cycle). (3) A circuit from the condenser (cooling cycle) to the bypass reheat coils. During cooling cycle, water from the wells passes through condenser where it picks up heat. This warmer water then returns to the disposal wells. Water from main cooling coils is cooled by the chiller in a closed loop. During heating cycle, water from the wells gives up heat in the chiller and this cooler water is returned to the disposal wells. Water from the main coils is heated by the condenser in a closed loop. The difference in the temperature of the water entering and leaving the main cooling coils is a measurement of the heat being removed or added to the circulated air. The difference in the temperature of the water leaving and returning to the wells is a measurement of the amount of heat being removed from or added to the well water. The output of the compressor is controlled by a Honeywell miniature indicating-controller to maintain a temperature of 45° for cooling and 105° for heating of the supply water for the well coils. For further explanation of system operation, refer to notes on diagram at left.

. . . with Honeywell Supervisory DataCenter

Greater operating efficiency with less personnel time . . . longer equipment life . . . operational savings that liquidate cost . . . attractive display of your engineering design—all this can be accomplished with the centralization made possible by the Honeywell Supervisory DataCenter. More than 100 of these installations are now in operation throughout the country.

All components of the DataCenter are manufactured by Honeywell. And *only* Honeywell manufactures pneumatic, electric and electronic controls and instruments.

For further information about the DataCenter and other Honeywell control concepts, call your local Honeywell office. Or if you prefer, write to Minneapolis-Honeywell, Dept. HA-11-143, Minneapolis 8, Minnesota.

For news about another major Honeywell contribution to air conditioning, turn the page. →

Who said dirt cheap?

Hospitals have a special need for air that's cleaned electronically. In operating rooms, nurseries, emergency rooms—in fact, throughout the hospital—it cuts down on airborne germs, giving important help in lowering the infection rate.

Many manufacturers of precision products find electronically cleaned air a near-essential to efficient production. It also eases maintenance problems caused by airborne dirt; and it keeps nuisance dirt off desks and files in office areas.

*New Honeywell Electronic Air Cleaner removes 6 times more costly dirt than mechanical filters**

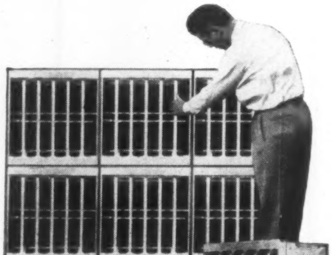
IN ADDITION to the cases shown above, most soiling of your client's work surfaces, walls, fixtures and merchandise is done by airborne particles less than 1/25,000 of an inch in size.

Particles much smaller than these—including the bacteria and viruses that cause many respiratory ills—can be removed by Honeywell's new Electronic Air Cleaner.

It is an impossible job for the mechanical type filter to remove oil smoke, fumes, tobacco smoke and much of the dust and fly ash that fall into this microscopic class of contaminants. And these are the ones with the greatest staining power.

The new Honeywell Air Cleaner's wide range of protection offers a scientific way to cut the high costs of cleaning, soiled merchandise, mechanical failures and absenteeism by trapping airborne dirt *before* it has a chance to steal your client's profits.

Your next job, whatever it is, can probably benefit from a Honeywell Electronic Air Cleaner. Specify it with confidence; the advantages more than pay for installation. For complete information, call your local Honeywell office or write Minneapolis-Honeywell, Dept. HA-11-268, Minneapolis 8, Minnesota.



Honeywell Electronic Air Cleaner

To aid the engineer—Honeywell makes a complete range of Electronic Air Cleaners for any type of air conditioning or ventilating system. Number of cells is determined by amount of air handled by the system. *Module construction* makes installing and servicing easy. Sales and service aid available in 112 Honeywell offices across the nation.

Honeywell

H HONEYWELL *First in Controls*

**According to the National Bureau of Standards tests, electronic air cleaners remove at least 90% of the dirt particles causing the greatest staining, while ordinary mechanical filters remove only about 15%.*

Money-saving way to watch temperatures!

Honeywell Temperature Monitoring System checks temperatures in an entire building from one location

DEGREES FAHRENHEIT

Pushbutton efficiency in temperature reading. Engineer pushes button on door of indicator, reads corresponding temperature on the dial above. Low voltage wiring connects instrument panel to sensing element in each thermostat.

Saves time—work—reduces maintenance cost!

THIS HONEYWELL Temperature Monitoring System enables the operating engineer to read the temperature at any point in the system simply by pressing a button.

He can check instantly the temperatures of private offices, zones on each floor, outside air, chilled water lines, hot water lines or points throughout the fan system, thereby saving hours spent visiting each location. Any number of points can be connected to the system. And because the sensing elements for the indicator are located right in the thermostats, there's no need for dual installation.

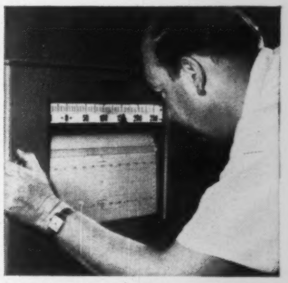
Makes Records as Needed!

At little extra cost, a Honeywell Systems Analyzer can be added.

This, connected by a plug-in-jack assembly using the same wiring and sensing elements as the indicator, records on a 12-inch wide strip chart the readings for any point or combinations of points. Recordings can be made as needed, disconnected when not needed.

For further information, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HA-11-268, Minneapolis 8, Minn.

Plug-in-jack assembly gives new versatility to systems analyzer. Engineer uses this assembly to plug chart recorder into point or any combination of points he wants recorded, gets record for any period of time.



Multipoint Strip Chart Recorder, available with from 2 to 20 channels, is the recording instrument of the analyzer. It keeps easy-to-read records of system's check points. Each point is identified by a number and different color.

Honeywell

H HONEYWELL

First in Controls

In Iron Body Wedge Gate Valves, Outside Screw and Yoke Design,

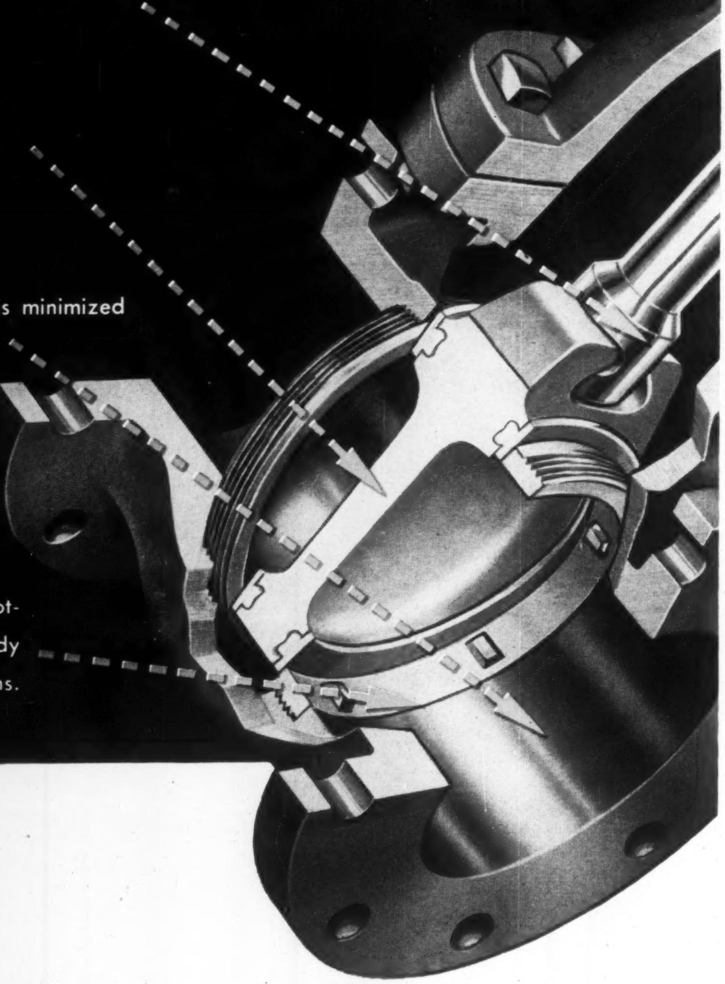
Walworth offers you these 8 outstanding advantages!

STRONGER CONNECTIONS. T-head disc-to-stem connection on OS&Y types permits wedge to properly seat itself.

TIGHTER SEAL. Solid web type disc on OS&Y valves provides tight closure, greater strength and longer service.

REDUCED TURBULENCE. Fluid action is minimized due to this straight-flow port design.

FEWER OBSTRUCTIONS. Seat rings of bottom-seated types are screwed into body to prevent gum and grit accumulations.



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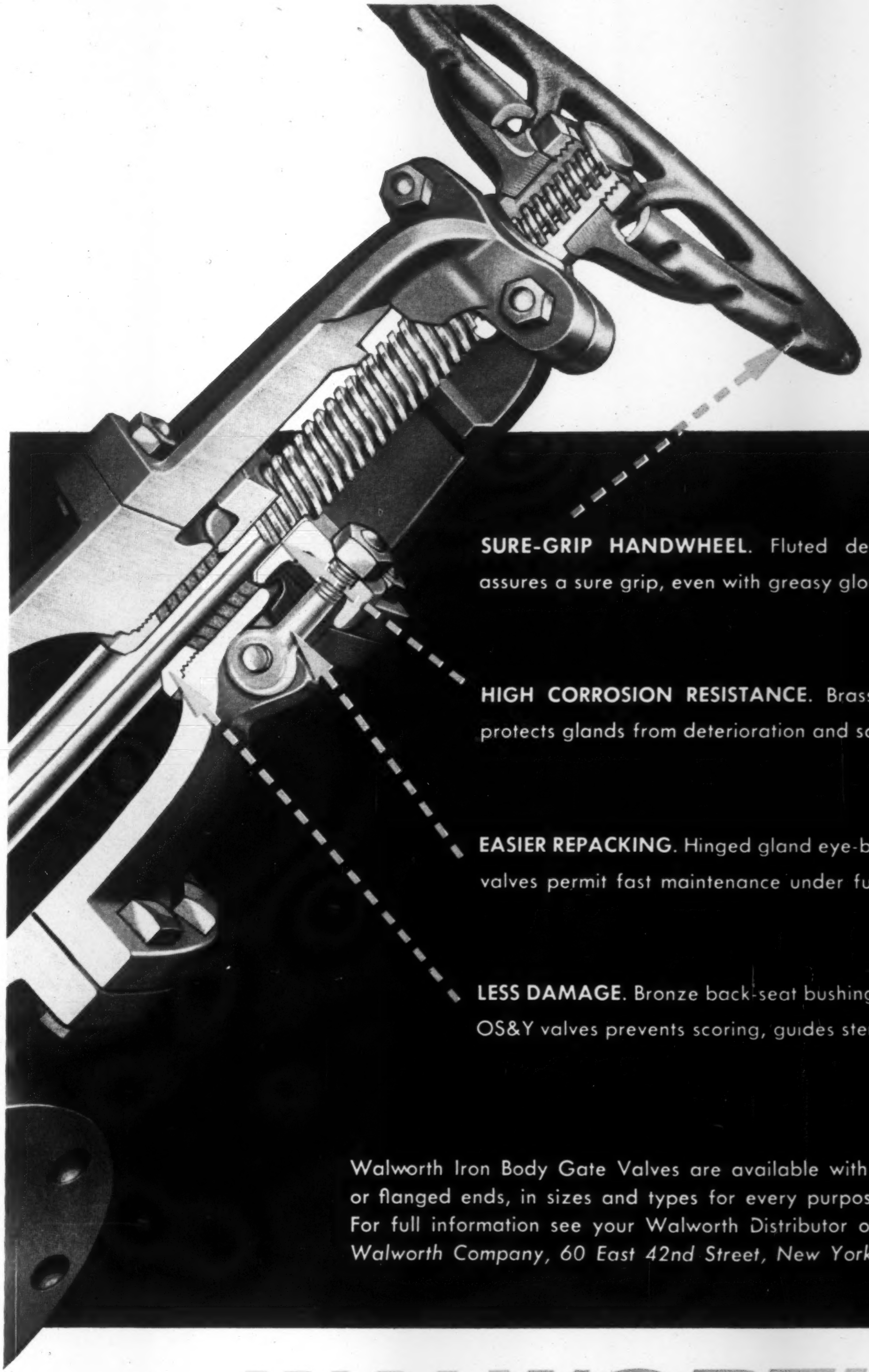


SURE-GRIP HANDWHEEL. Fluted design assures a sure grip, even with greasy gloves.

HIGH CORROSION RESISTANCE. Brass liner protects glands from deterioration and scoring.

EASIER REPACKING. Hinged gland eye-bolts on OS&Y valves permit fast maintenance under full pressure.

LESS DAMAGE. Bronze back-seat bushing in bonnet of OS&Y valves prevents scoring, guides stem accurately.

Walworth Iron Body Gate Valves are available with screwed or flanged ends, in sizes and types for every purpose. For full information see your Walworth Distributor or write: *Walworth Company, 60 East 42nd Street, New York 17, N. Y.*

WALWORTH*

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

M & H VALVE & FITTINGS CO. • SOUTHWEST FABRICATING AND WELDING CO., INC. • WALWORTH COMPANY OF CANADA, LTD.

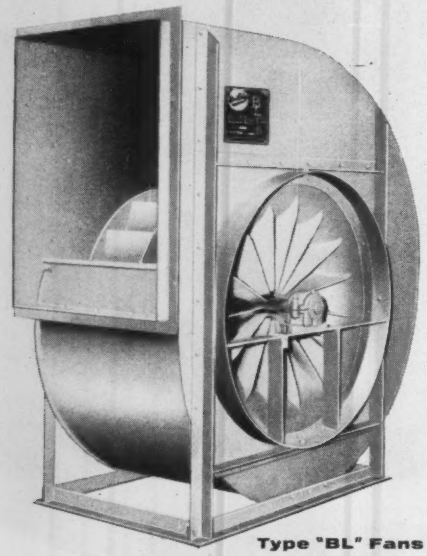
YOUR GUIDE TO

IN CENTRAL SYSTEM

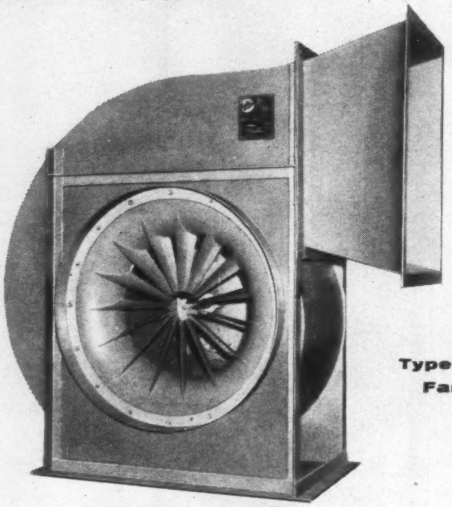
TO SUPPLY LARGE SYSTEMS IN CLASS I SERVICE — The "Buffalo" Type "BL" Fan is engineered to handle the requirements for supplying large ventilation, air conditioning and air cleaning systems. Proved in a wide variety of the biggest installations, the "BL" offers many outstanding characteristics. The "Buffalo" Type "BL" Fan insures extremely dependable, quiet, efficient operation — delivers stable performance from zero pressure to shutoff — is non-overloading over all conditions of system pressure — is available in capacities up to 500,000 cfm, with all drive components for any discharge angle. For maximum performance and complete satisfaction on your systems up to 3¾" pressure, you can safely specify the "Buffalo" Type "BL" Fan. Write for Bulletin F-102.

FOR CLASS II-IV HIGH PRESSURE SERVICE — The "Buffalo" Type "BLH" Fan delivers up to 86% mechanical efficiency — proved in actual performance. This insures complete satisfaction on your modern, high pressure conduit air conditioning, mechanical draft and industrial jobs. The high performance quotient of the "BLH" is possible because of the backward curved blades, and the complete inlet-to-outlet streamlining that are designed into all "Buffalo" Fans. In addition, the "BLH" offers the same noteworthy characteristics that have made the "BL" famous: unusually quiet operation, stable performance, non-overloading factor. The "BLH" is also available in capacities up to 500,000 cfm. Because of this desirable combination of characteristics, the "Buffalo" "BLH" is the fan to specify for Class II to IV heavy-duty ventilating and air conditioning. Write for Bulletin F-200 — it will convince you.

FOR COMPACTNESS, LIGHT WEIGHT AND STRAIGHT-LINE EFFICIENCY — Do you have a space problem? "Buffalo" Axial Flow Fans are duct-size, to fit in close to walls and ceilings. They do an outstanding job in many space-saving applications — from boiler room cooling to paint spray booth exhaust. Important to you are the high efficiencies and rigid construction of this unit, together with compact size. Lighter weight of "Buffalo" Axial Flow Fans means economical installation. Except for the very largest sizes, no heavy foundations or structural supports are needed. These units are often installed as part of the pipe or stack in hood and vat, or other exhaust systems. "Buffalo" Axial Flow Fans are most efficient when mounted in straight duct runs. These units have a reputation for excellent service as duct-mounted boosters in systems. They perform very efficiently as light-duty ventilation, exhaust and industrial air conditioning supply fans. For full details, write today for Bulletin 3533-EF.



Type "BL" Fans



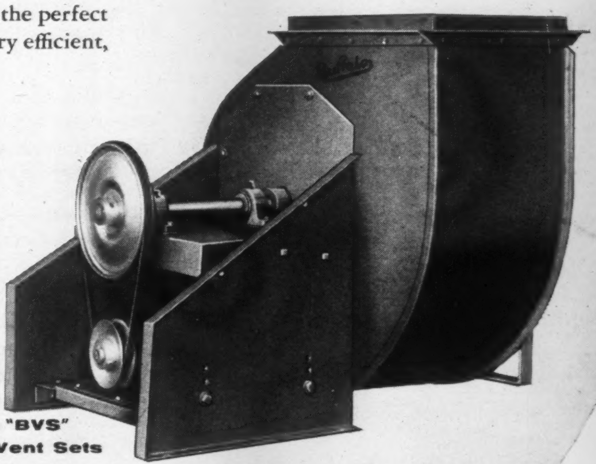
Type "BLH" Fans

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT

THE "BIG FOUR"

VENTILATING JOBS

FOR LOW-COST, VERSATILE ZONE VENTILATION — Do you have a zone ventilation problem where quiet operation and flexible approach to your floor space problems are of top importance? Then the "Buffalo" Type "BVS" Belted Vent Sets may well be the perfect solution in every way. "Buffalo" Belted Vent Sets are very efficient, extremely quiet and non-overloading. They offer unusual advantages of economy and adaptability because of their simple "package" installation, either indoors or out. Belted Vent Set capacities range from 1000 to 20,000 cfm. Capacity is adjustable merely by changing sheaves — underscoring their unique versatility. There's a "Buffalo" Vent Set—or combination of sets—to match your precise needs. Bulletin 3720 gives full information; be sure to write for it.



Type "BVS" Belted Vent Sets

All "Buffalo" Fans are Designed and Engineered with the Famous "Q" Factor — the Built-In Quality Which Provides Trouble-Free Satisfaction and Long Life.

Call the Trained "Buffalo" Engineering Representative in Your Nearest Principal City — He Will Be Happy to Work with You on Any Job.

Axial Flow Fans

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

With **Youngstown Steel Pipe** on the job new **Lamson & Sessions** plant gets dependable, life-time piping system

To keep pace with the growing demand for their complete line of industrial fasteners, Lamson & Sessions Co. are erecting this new, beautiful, highly functional plant on Cleveland's Tiedeman Road. Providing dependability and long life for the plant's all-important piping system will be tons of quality Youngstown Steel Pipe.

For years leading architects, as well as progressive plumbing and heating contractors, have specified Youngstown Steel Pipe because it's been their guarantee of trouble-free water piping systems.

Youngstown Steel Pipe is made of only the finest steel with exacting attention given to all sizing, threading and finishing processes. Close quality control of every step in Youngstown's fully integrated operations—from ore mining to finish threading—produces the best pipe obtainable—anywhere.

Your Youngstown Pipe Distributor is only a phone call away—why not contact him today?

Building Owner:	Lamson & Sessions Company, Cleveland
Engineer:	The George S. Rider Company, Cleveland
General Contractor:	The Sam W. Emerson Company, Cleveland
Plumbing & Heating Contractors:	The Smith & Oby Co., Cleveland The Ed Sweeny Company, Cleveland
Distributor:	Grinnell Company, Cleveland

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
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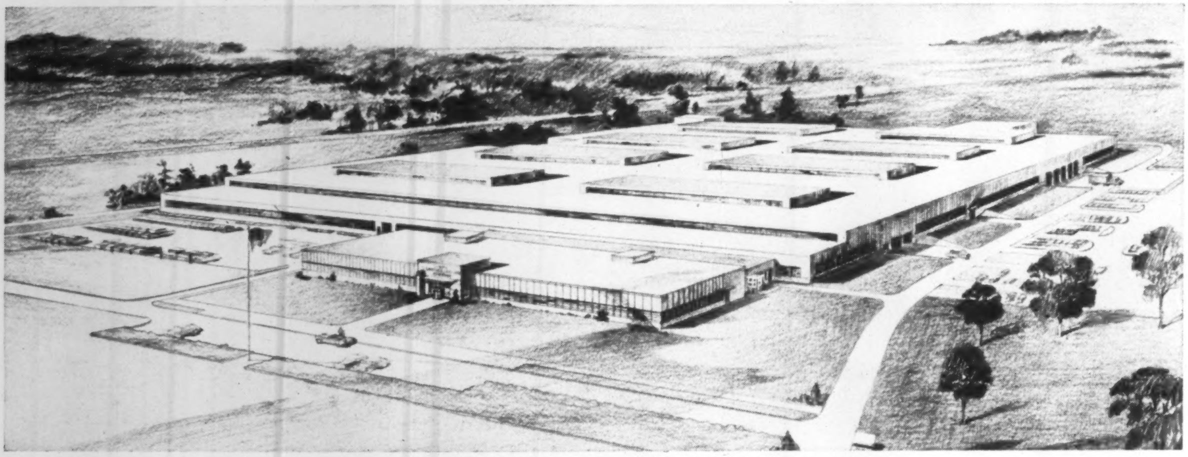
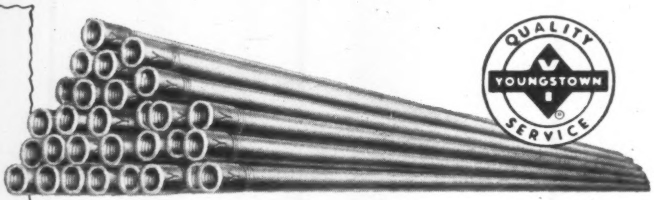


Specify Youngstown and secure these
7 Points of uniform goodness

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness



QUALITY YOUNGSTOWN SERVICE

INDIVIDUAL ROOM COMFORT ALL YEAR 'ROUND WITH

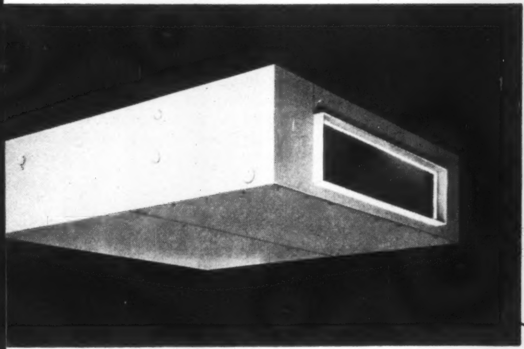
McQuay SEASONMAKERS

These McQuay Seasonmakers will furnish individual room comfort at any desired temperature level—heated, filtered air in the winter; cooled, dehumidified and filtered air in the summer—when used with a hot or chilled central water supply.

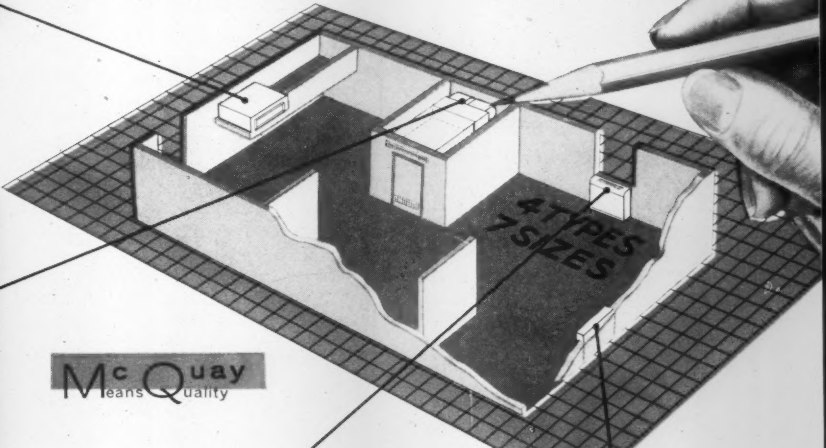
McQuay Seasonmakers are particularly designed for multi-room buildings, such as hotels, apartments, motels, hospitals, schools, offices and residences. All have the famous McQuay Ripple-Fin coils and are exceptionally quiet, handsome and built to last, with life lubricated fan motors having inherent overload protection with automatic reset. There are four types in a wide variety of sizes and capacities, each with 3 speed motor control switch.

Large size Ceiling and Hideaway Seasonmakers having nominal capacities of 2, 3 and 5 tons are also now available for commercial or residential applications where a duct air distribution system is necessary. Units available for Freon applications.

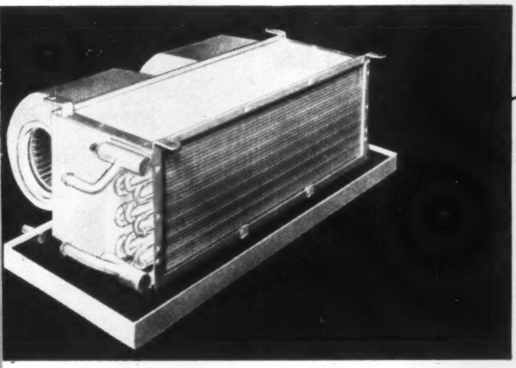
Whatever your requirements may be, you'll find McQuay Seasonmakers will meet them—and do the finest possible job. For complete information and specifications, call in the McQuay representative in or near your city. McQuay, Inc., 1601 Broadway St. N.E., Minneapolis 13, Minnesota.



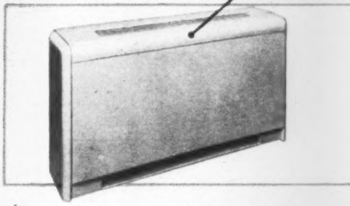
Ceiling Type Seasonmaker—for suspended mounting. 7 sizes, 200 to 2,000 c.f.m., ½ to 5-ton nominal cooling capacity. Thermally and acoustically insulated.



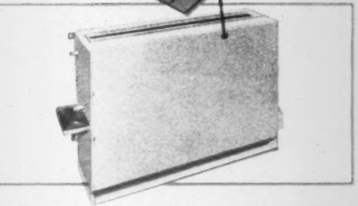
McQuay Means Quality



Hideaway Type Seasonmaker — for concealed, suspended mounting in closets, attics, or furred spaces. 7 sizes, 200 to 2,000 c.f.m., ½ to 5-ton nominal cooling capacity. Insulated drain pan.



Floor Type Seasonmaker—for free standing floor mounting. 4 sizes, 200 to 600 c.f.m., ½ to 2-ton nominal cooling capacity. Thermally and acoustically insulated. Choice of 3 air discharge grilles.

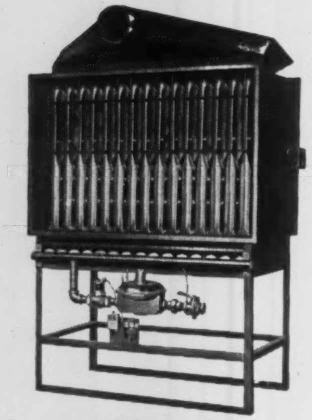


Basic Type Seasonmaker—for fully recessed built-in wall installations. 4 sizes, 200 to 600 c.f.m., ½ to 2-ton nominal cooling capacity. Thermally and acoustically insulated.

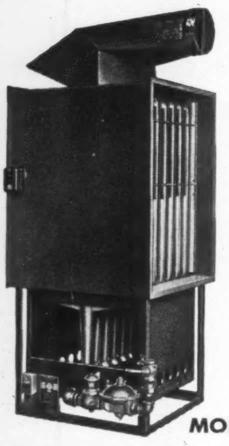
McQuay INC.

MAKE THE SEASONS COME TO YOU

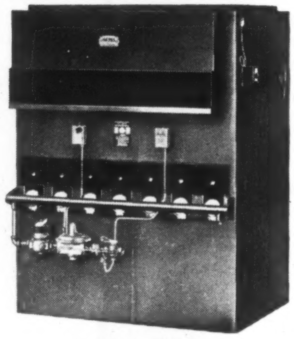
AIR CONDITIONING
HEATING
REFRIGERATION



MODEL SED-E



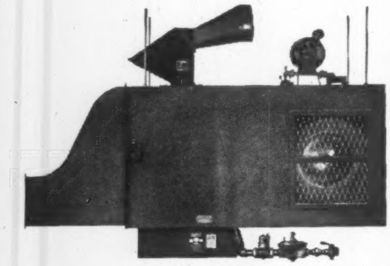
MODEL SED-S



MODEL SED-VF

MODEL SED-E — Non-corrosive type 321 stainless steel heat exchanger. Permits installation downstream of cooling equipment, for continuous blower operation. Air throughput in either direction. 80,000 to 600,000 Btu input.

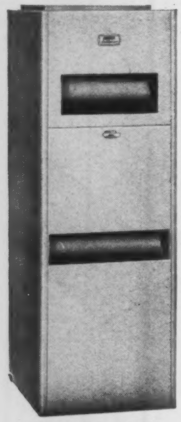
MODEL SED-S — Same as SED-E except controls are at the side, instead of at the end where accessibility requires. Either SED-E or SED-S is available in sizes from 80,000 to 600,000 Btu input in increments of 40,000 Btu.



MODEL SEU

MODEL SED-VF — Tested and approved as a duct furnace; type 321 stainless steel. Re-circulated or fresh air enters through bottom, sides, or back. Built-in air bypass, vent in front. Sizes from 70,000 to 245,000 Btu input.

MODEL SEU — Suspended unit heater. Recirculates room air. Diffuser outlet with adjustable vertical and horizontal vanes. Double inlet forward curve blower. Continuous duty, variable pitch drives, raised port burners. 80,000 to 600,000 Btu input.



MODEL SEC

HAYES

FURNACES

outstanding for commercial, industrial, schools, churches, theaters, large residential

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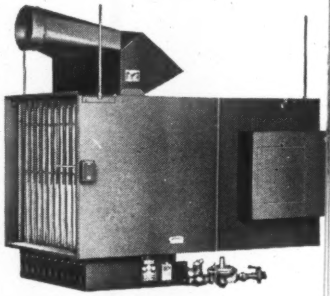

MODEL SES

MODEL SEC — Forced air furnace. Stainless steel heat exchanger sections seam and arc welded. One piece cast iron burners with drilled ports. Oversize double inlet blower, glass or washable filters. 6 sizes — 70,000 to 245,000 Btu input. For zero clearance.

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Dealers Supply Company, Atlanta, Georgia.
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MODEL SES—Forced air, suspended furnace for installation in suspended duct system. Inlet and outlet designed for sheet metal duct connection. Double inlet forward curved blower. Continuous duty variable pitch drives, raised port burners.

Petro HEAVY OIL BURNER

Simple and practical
that's why it's
DEPENDABLE

Residual oils are low cost fuels. They have higher heat value than light oils, and usually cost less per gallon. But in spite of their economy they are often avoided because they are considered difficult to handle and burn. A moderate change in temperature can change them from a fluid to a sluggish semi-solid.

These heavy oils (Nos. 5 and 6) are easily controlled and burned by the Petro system which is remarkably free from mechanical complexities.

1. A simple oil heater automatically warms the oil to a point where a common viscosity is reached. (Fuel oils approach this at a temperature of about 160 degrees).

2. An automatic valve passes the oil to the nozzle only when it is warm enough for accurate metering and instant ignition.

This is the basis of the Petro "Thermal Viscosity Principle." The Petro burner isn't fancy; it isn't temperamental; but it *stays on the job.*

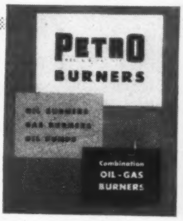
In spite of its ruggedness, the Petro heavy oil burner is precision equipment which will operate efficiently with any type of automatic control system.

Petro oil burners have been the steady, reliable work horses in heavy oil firing for over 50 years. They have saved their owners untold thousands of dollars in low fuel and maintenance costs.

For further information, please mail coupon.

Send for this PETRO® catalog

Over 50 years of leadership in automatic heating and power equipment



PETRO, 3532 W. 106th Street, Cleveland 11, Ohio.
In Canada, write to 2231 Bloor St., W., Toronto, Ontario.
Please send me literature and specification sheets on the money-saving Petro forced draft firing system.

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AIR-CONDITIONING
& REFRIGERATION
INDUSTRY
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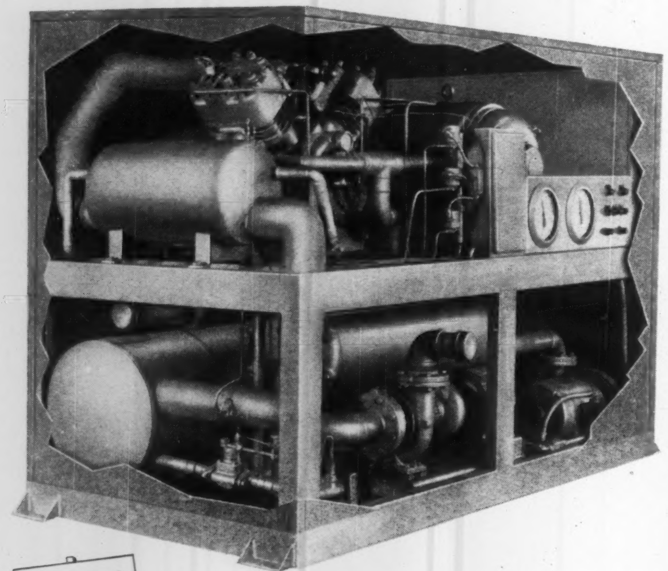
CHICAGO
NOV. 18-21, 1957

See OUTSTANDING B&G ADVANCES IN PACKAGE COOLERS AND REFRIGERATION COMPONENTS

BOOTHS
525-526

B&G presents a complete line of air conditioning and refrigeration equipment, alive with new, exclusive features! New efficiencies have been designed into these products which materially reduce space requirements—improve operating economy—add to life of the equipment.



COMPLETELY SELF-CONTAINED PACKAGE LIQUID COOLERS— 7½ to 75 tons

Compare the *standard* equipment of the B&G Package Liquid Cooler with that of any other... see for yourself that you can have B&G quality at smaller installed cost. For example—

No inside wiring. All controls furnished—completely wired and interlocked.

No inside piping. All pumps are mounted, piped and electrically interlocked.

No framing. All equipment is mounted on permanent steel frame.

No metal forming. Heavy gauge steel jacket is sound-deadened, Hammerloid finished.

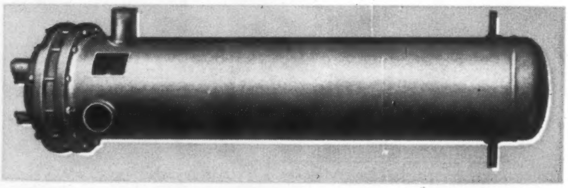
No insulating. Suction line and heat exchanger are fully insulated.

No testing. Fully tested under specified operating and varying load conditions.

No extras. Furnished complete with gauges, compressor motor and flywheel, increment start, heat exchanger and full charge of Freon.

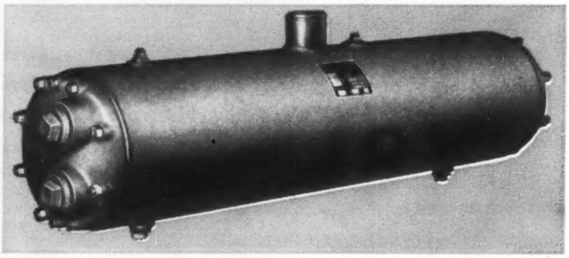
EVAPORATOR—50% smaller

This Code stamped ASME Evaporator features tubing with specially designed interior metallic spline which almost triples inside heat transfer area...reduces unit size and Freon charge. Tube design permits U-bend construction without losing contact between spline and tube. *B&G Evaporators are unconditionally guaranteed against tube damage from freeze-ups!* Leak-proof, styrene insulation is molded directly on shell.

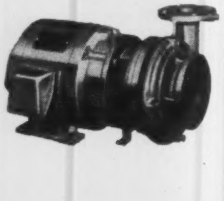


CONDENSER—2 to 200 tons

One-third smaller than previous models—less Freon needed. Exclusive design lowers pressure drop—raises operating efficiency. Tubes are rigidly supported in stacks with metal-to-metal contact between fins for free drainage of condensing Freon. Expensive sight glasses are eliminated by providing three liquid level openings. ASME Code stamped for Freon 12 and 22.



QUIET PUMPS
B&G 1522 Pumps are noted for *quiet*, leak-proof operation—ideal for cooling tower applications.



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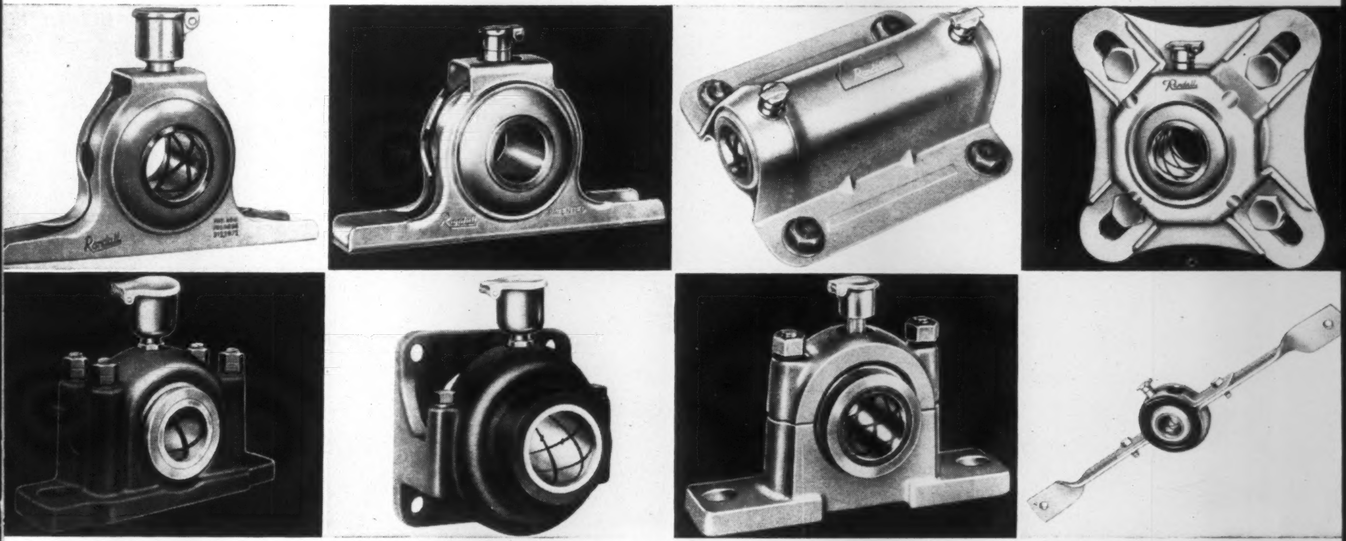

There's a Quiet...Self-Aligning...Self-Lubricating Randall Sleeve Bearing Assembly for Every Type Application

Controlled automatic lubrication . . . outstanding efficiency . . . and extended periods of operation without maintenance are the advantages Randall Bronze Sleeve Bearing Pillow Blocks provide for every type of application. This superior performance is the result of Randall's exclusive design and manufacturing skill.

There are no moving parts in the Randall bearing assembly. The "DEEP-WELL"® lubricant reservoir feeds the proper lubrication to all parts of the bearing surface through porous graphite plugs and grooves. This combination of oil and graphite lubrication in just the right quantity for any operating condition provides a perfect non-metallic cushion between the shaft and bearing surface so that the shaft spins smoothly and silently. Alignment of the bearing assembly with the shaft is automatic and remains so under all normal operating conditions.

Randall Pillow Blocks are compact, completely assembled units —supplied ready for installation. They are economical with their initial low cost plus quicker, easier installation.

The pillow blocks illustrated are representative of the complete Randall line. Randall Pillow Blocks are available for mounting in any position and with a variety of bronze bushings to meet all application requirements. The Randall "DEEP-WELL"® ball assembly, the heart of every Randall Pillow Block, may be purchased separately for use with a housing of your own design. Randall also supplies mounting grommets, safety collars and washers.

Your nearby Randall distributor, working with our engineers, can provide expert help in solving bearing problems. You'll find his name listed in the yellow pages of the telephone directory under "Bearings." Call him today.

Randall
SINCE 1906

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DUAL-DUCT

WITH DIRECT, AUTOMATIC VOLUME CONTROL

Exclusive with Buensod dual-duct air mixing units is direct volume control without the use of a sensing instrument. They maintain constant air quantity through each unit regardless of variance of static pressure on either inlet or outlet of mixing value.

NOW AVAILABLE IN ALUMINUM!

For the first time, you can order dual-duct air mixing units made of aluminum, inside and out. It's a Buensod first. Only Buensod makes aluminum air mixing units. Lighter by 60 per cent. Corrosion-resistant. The obvious choice for your next project.

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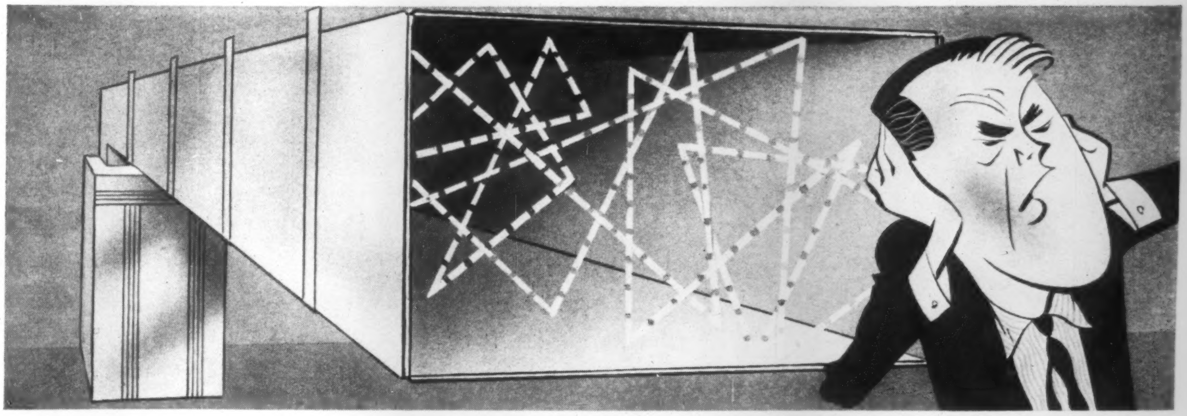
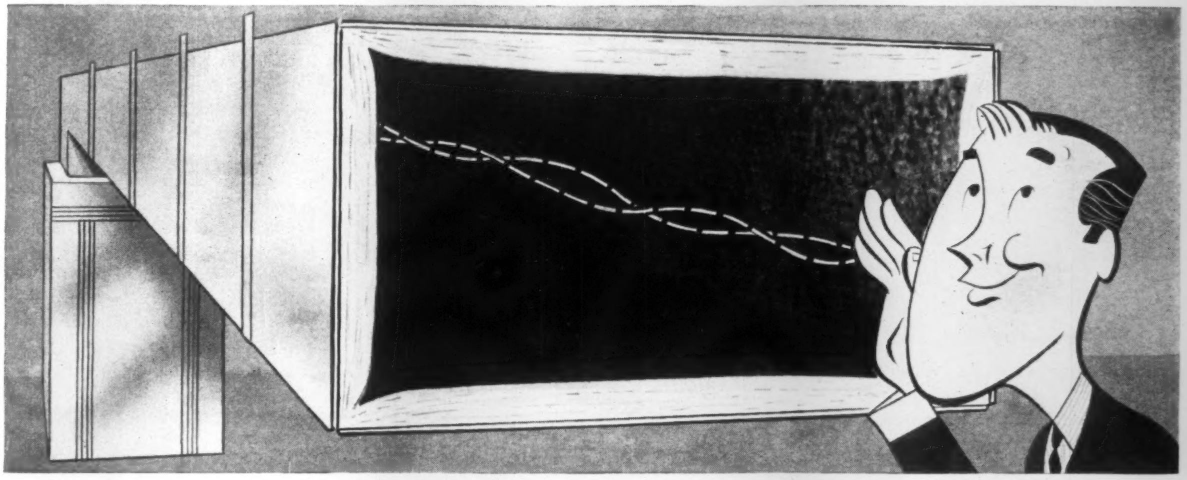


Mute air-conditioning-duct noises...



with black-vinyl-coated MICROTEX

New duct liner has high acoustical and thermal efficiency . . . plus the moneysaving advantages of pigmented vinyl coating

Microtex Duct Liner effectively absorbs mechanical noises—particularly in the 250 to 4,000 cps range, where most air-conditioning and heating-system noises occur. It efficiently insulates warm- and cold-air ducts against heat transfer. When ducts are lined with Microtex, the sheet metal itself acts as a vapor barrier.

L·O·F Glass Fibers' Microtex Duct Liner saves time and money at the job site. Its black vinyl coating saves painting inside ducts, near grilles or large registers; eliminates the possibility of paint flaking off into the air stream. Pigmented vinyl quickly shows inspectors that Microtex Duct Liner is *fully coated* to resist air erosion, even at peak velocities. When ducts are lined, exterior surfaces are easy and economical to paint or finish as desired.

Microtex Duct Liner cuts costs in the shop, too. It's strong and resilient . . . easily withstands routine shop handling without damage. Microtex is semirigid, yet light in weight . . . easy to cut, pleasant to handle. Black vinyl clearly indicates the air-stream side as Microtex is applied to the sheet metal. Resiliency of Microtex permits forming insulated metal sheet in the brake without damage.

Get the facts today on economical Microtex Duct Liner in 1½, 2 and 3 lb./cu. ft. densities. Contact your distributor, or write: *L·O·F Glass Fibers Company, Dept. 39-117, 1810 Madison Avenue, Toledo 1, Ohio.*

L·O·F GLASS FIBERS

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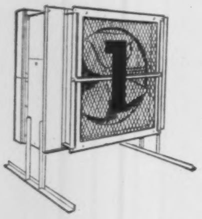
ONLY KRAMER UNICON + WINTERSTAT* GUARANTEES ALL 4

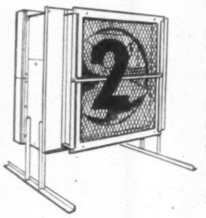
MAXIMUM LIQUID PRESSURE AT EXPANSION VALVE IN WINTERTIME



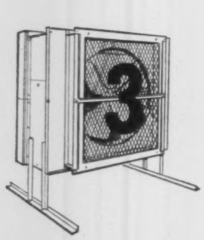
Only the Kramer UNICON plus WINTERSTAT guarantees the full refrigerant pressure *at the expansion valve* for full cooling capacity — even at below 0°F outdoors — *automatically!*

MAXIMUM SUMMER CAPACITY WITH PATENTED WINTERSTAT

Only Kramer UNICON plus WINTERSTAT guarantees maximum condensing capacity in summer. In hot weather, the patented WINTERSTAT is out of the refrigerant circuit, permitting normal drainage from the condenser without restriction. This assures maximum condensing capacity in summer — *automatically!*

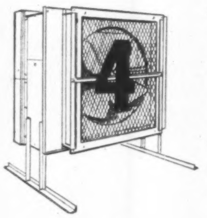


PROMPT DEFROSTING AT ANY OUTDOOR TEMPERATURE



The use of UNICON plus WINTERSTAT makes Kramer THERMOBANK the only low temperature system that can guarantee operation and complete defrosting at any outdoor temperature—even 0°F or lower—*automatically!*

IMMEDIATE COMPRESSOR START-UP REGARDLESS OF OUTDOOR WINTER TEMPERATURE



Only Kramer UNICON plus WINTERSTAT (using modification #1) ensures positive and immediate compressor start-up with pressurestat operating the system, regardless of outdoor winter temperatures at the UNICON and regardless of length of compressor lay-off — *automatically!*

**UNICON is a remote type air-cooled condenser   WINTERSTAT is a year 'round automatic head pressure control*

WRITE FOR BULLETIN U-210-L

KRAMER TRENTON CO. • Trenton 5, N.J.

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

ON ALL COMMERCIAL REFRIGERATION - AIR CONDITIONING AND AMMONIA INSTALLATIONS

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and the
Level Master
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as a
perfectly matched
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for
Right
Down the Line
Peak Performance
...regardless
of job size!

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Catch-All
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November 18-21, 1957

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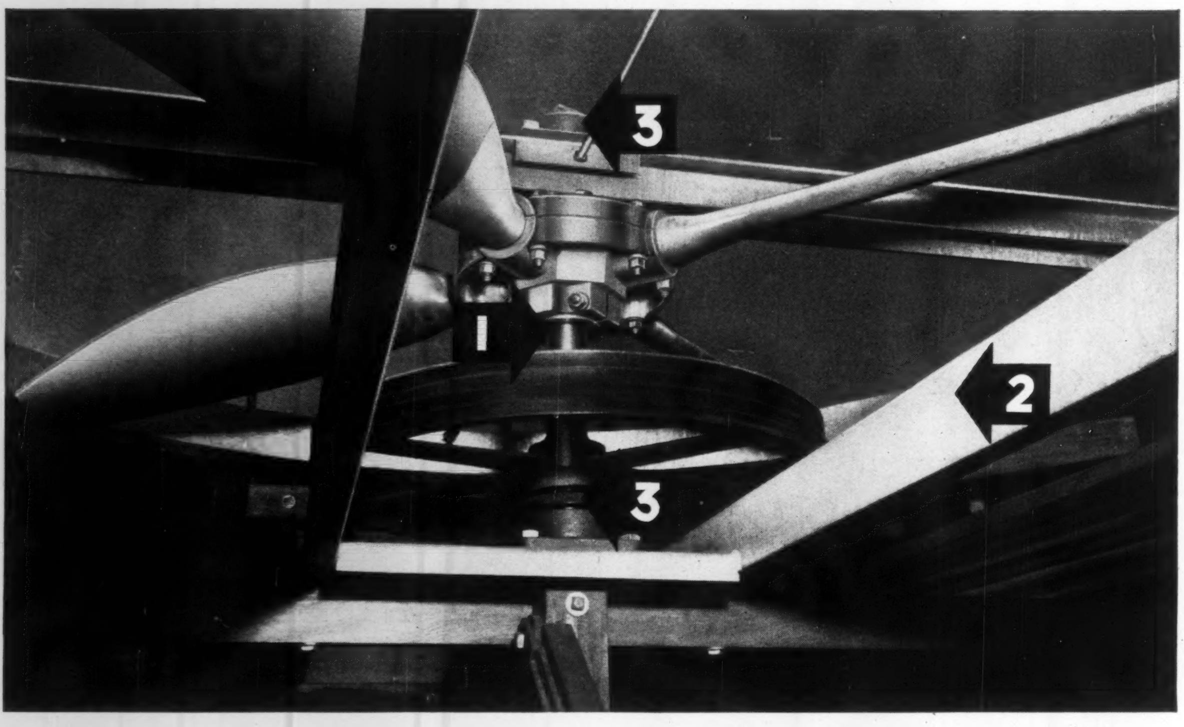
THE Pritchard LoLine®

HAS MECHANICAL FEATURES THAT ADD UP TO LONGER LIFE, TROUBLE-FREE OPERATION



TEFC MOTORS . . . totally enclosed, fan cooled motors are standard equipment on both Series "B" (8′ high) and Series "R" (12′ high) LoLine towers. They require no additional enclosure or protection against weather.

❶ **STAINLESS STEEL FAN SHAFT . . .** on multi V-belt drive, eliminates costly corrosion problems and hazards of fan shaft breakage.

❷ **HOT-DIP GALVANIZING . . .** all steel parts are hot-dip galvanized after fabrication. The one proven method to successfully stop rust and corrosion.

❸ **OVERSIZED BEARINGS . . .** factory sealed and widely separated to reduce bearing load. Bearings on multi V-belt drive have grease fittings brought to outside of fan ring for easy, safe lubrication.

SPEED REDUCER DRIVE (Standard on Series "R")...uses spiral bevel gear rated by AGMA methods and built specifically for cooling tower service, assuring adequate size for duty.

DRIVE SHAFT FOR REDUCER (Standard on Series "R") . . . is full floating, non-lubricated with stainless steel, flexible discs for longer life. All of these mechanical features found in the LoLine cooling tower add up to maximum performance and years of trouble-free service.

Whether It's for Air Conditioning Use or Industrial Service You Get More for Your Cooling Tower Dollar with a Pritchard LoLine

ALL THE FACTS AT YOUR FINGERTIPS

Get all the facts on the outstanding Pritchard LoLine Cooling Towers . . . including complete engineering data . . . by writing today on your company letterhead for the new, LoLine Bulletin (No. 5.1.902). This unique brochure gives you all the information you will want in one convenient source. Write for your FREE copy today!

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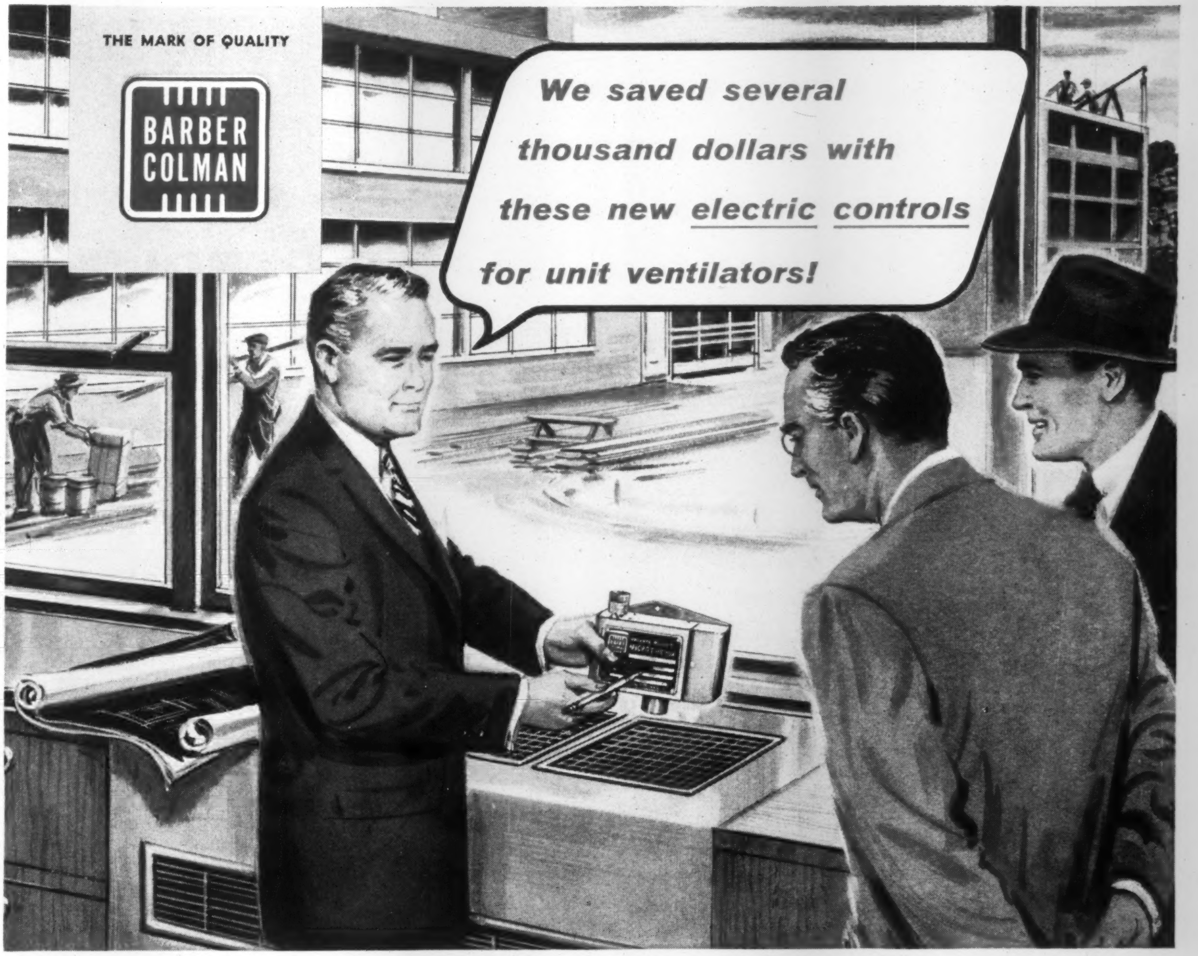
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BARBER COLMAN
We saved several thousand dollars with these new electric controls for unit ventilators!

Ask your engineer or architect, who knows, about the better temperature control and substantial savings now possible... with Barber-Colman's exclusive electric control systems

If you are planning to install unit ventilators in your classrooms, here's good news for you. New electric automatic controls recently developed by Barber-Colman Company assure *more* stable classroom temperature and fresh air supply — and *reduce initial costs* substantially! And because these new controls are completely enclosed in the unit ventilator, settings can be changed only by your authorized personnel.

Designed specifically for today's modern schools, this exclusive unit ventilator control system is your guarantee of ideal "classroom weather" with important dollar savings on initial unit costs . . . installation costs . . . and operating costs.

Be sure to ask your engineer or architect about this important equipment or contact your nearest Barber-Colman field office, located in all principal cities, for additional facts and application data on unit ventilator control.

send today!

Better Control...
Automatic Controls

The full story on "Better Control Electrically" — specially written and illustrated for school officials. Covers control of all major types of heating and ventilation. See pages 10 and 11 for unit ventilator systems. Free.

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THE MARK OF QUALITY

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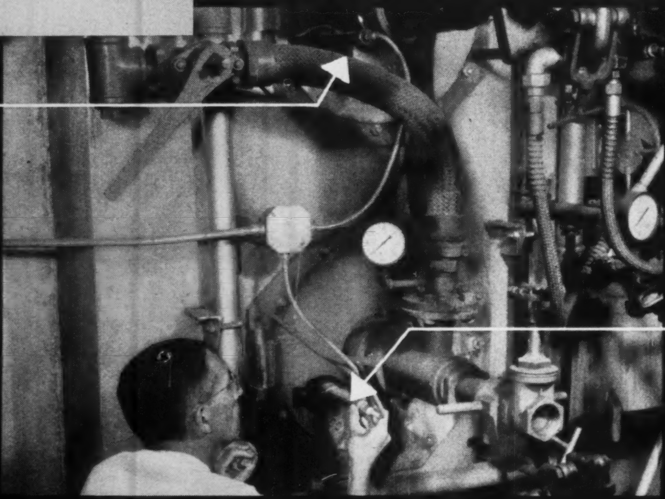
Wheelco Instruments

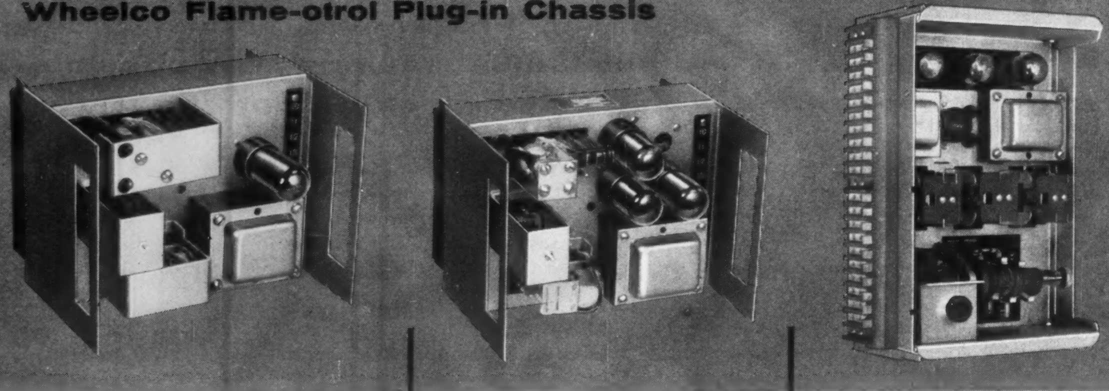
a look under the cover shows why –
Wheelco FLAME-OTROLS
give better flame-failure protection



OIL- AND GAS-FIRED FURNACES, BOILERS, KILNS, AND DRYERS RELY ON COMPLETE LINE OF ELECTRONIC COMBUSTION SAFEGUARD SYSTEMS

Arrows indicate Wheelco lead-sulphide Flame-eye used on industrial-type combination oil-gas burners.

Wheelco Flame-otrol Plug-in Chassis



Model 1470 (manual-starting)
CONDUCTIVITY RECTIFICATION "CR" SYSTEM

. . . takes advantage of the unique features of a flame being able to conduct a small amount of electrical current with flow of electrons in direction of flame being greater than "up-stream."

Model 1570
INFRA-RED "IR" SYSTEM

Uses lead-sulphide photoconductive cell predominantly sensitive to infra-red energy as a flame pickup. It operates in conjunction with a "flame-only" type current when a flame is present and ignores constant bright background effect.

AUTOMATIC OPERATION

Two basic models (1474 and 1574) use same sensing elements as models listed above. Sequence timing for oil- or gas-fired burner or boiler operation includes: purging, warm-up proving, pilot-proving, low-fire stabilization, ignition-timing, and post-purging.

There's no need to "stretch" in order to make a combustion safeguard system fit your exact needs. From Wheelco's complete line you can select *exactly* the right Flame-otrol required by your installation — manual, semi-automatic, or fully automatic.

Whatever type of installation meets your requirements best, you'll be assured of getting a unit that's dependable in operation and simple to maintain. First, and foremost, there's the famous Wheelco plug-in design that conveniently enables the entire chassis to be removed for adjustment, examination, and repair.

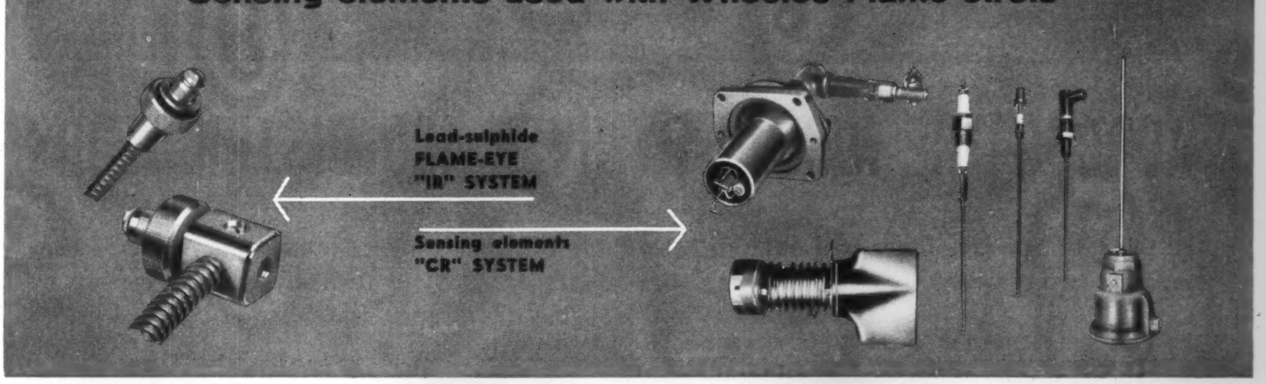
In addition, convenient checking strips permit checking circuits and voltage with simple and readily available instruments. Standard electronic tubes are used on all Flame-otrol models, simplifying parts inventory and eliminating a possible replacement problem.

Because all Flame-otrol components are housed in a rugged, industrial-type steel cabinet, the unit operates satisfactorily in all types of plant locations. The gasketed, dust-tight, swing-out cover keeps out foreign matter that could impair operating efficiency.

Wheelco Control centers, designed with removable sections to meet changing requirements, are available to house complete combustion safeguard systems. Here, too, significant savings on installation costs and time are assured in a custom-engineered installation.

The quickest way to be sure of having a complete combustion safeguard system designed for your specific needs is to call your nearby Wheelco field engineer and let him analyze your requirements. This "no obligation" survey takes into consideration both economic and technical factors and results in a down-to-earth recommendation that insures you'll get the best possible buy for each dollar invested.

Sensing elements used with Wheelco Flame-otrols



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J&L SUPERIOR
QUALITY STEEL PIPE
SOLD...

ACROSS THE NATION BY OVER 400 DISTRIBUTORS

It pays to specify Jones & Laughlin steel pipe for two reasons:

1. You get superior quality pipe. Jones & Laughlin is an integrated steel company. This permits rigid quality control from raw materials through the finishing mills. You can be sure of long-lasting, trouble-free installations with J&L steel pipe.

2. You are sure of a dependable source of supply. J&L pipe is sold by over 400 leading distributors across the nation. They carry complete stocks for prompt service. And they are prepared to furnish technical service by steel pipe specialists.

Whenever you need superior pipe and dependable service, call your nearest J&L distributor or write direct to Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J&L STEEL

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. . . a great name in steel

heat-x

BRUNNER

SINCE 1906

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NAMES WORTH KNOWING

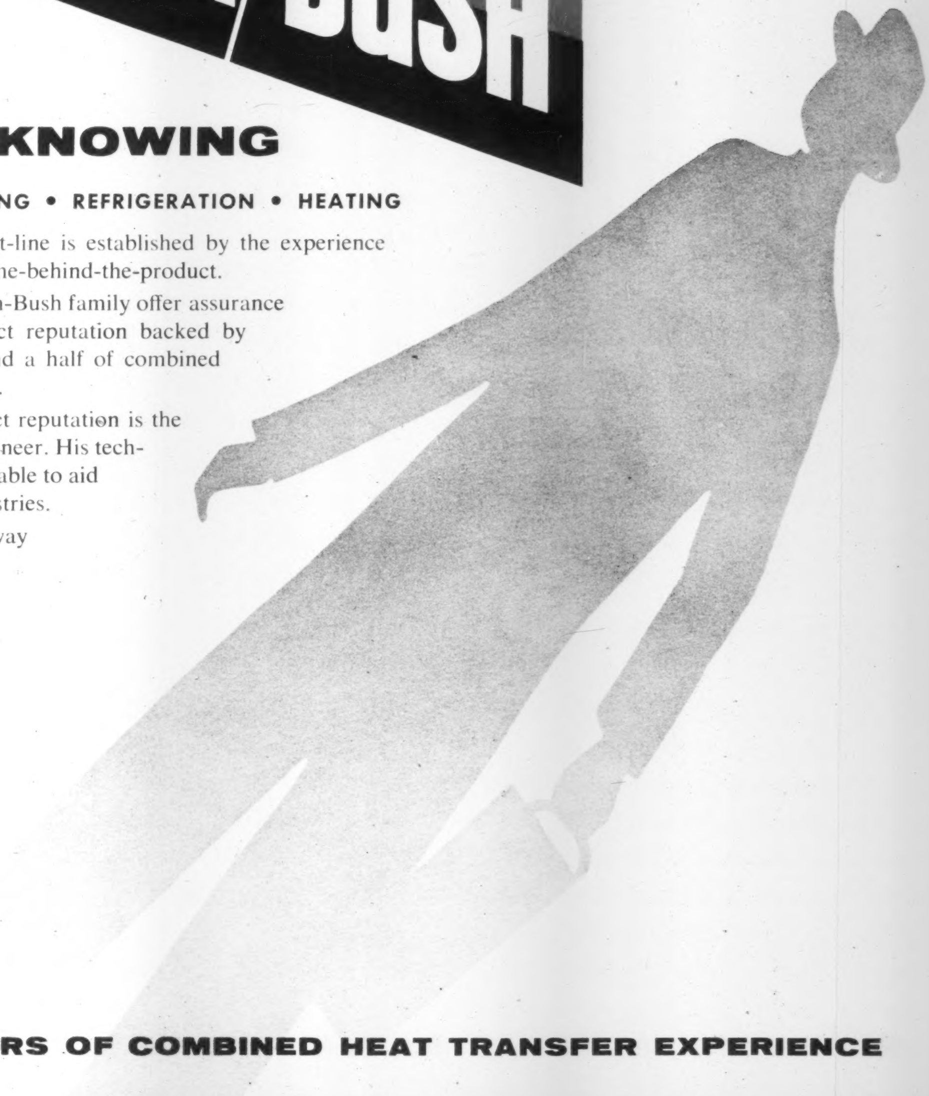
IN AIR CONDITIONING • REFRIGERATION • HEATING

Reputation of a product-line is established by the experience and integrity of the name-behind-the-product.

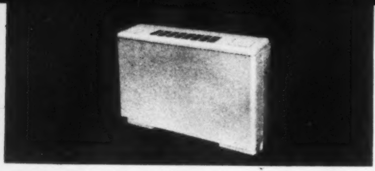
Members of the Dunham-Bush family offer assurance of a dependable product reputation backed by more than a century and a half of combined heat transfer experience.

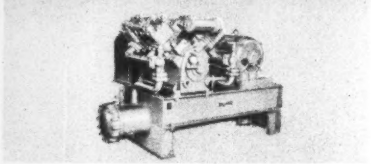
Perpetuating fine product reputation is the Dunham-Bush sales engineer. His technical skills are ever available to aid you in three major industries.

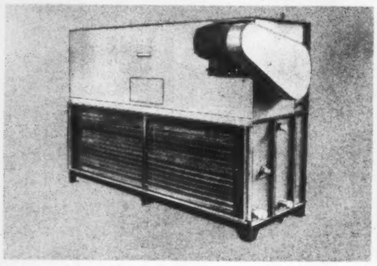
May we send him your way for a courtesy call?

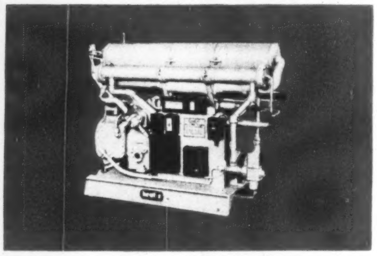


167 YEARS OF COMBINED HEAT TRANSFER EXPERIENCE









AIR CONDITIONING

Whatever your requirements in Air Conditioning equipment, there's a dependable Dunham-Bush unit to satisfy the specification. 'AH' Central Station Air Handling Units, 'MZ' Multi zone Units, 'CR' Room Air Conditioners, 'CC' Comfort Conditioners, 'CPU' Pre-Engineered Commercial Package Units, Direct Expansion, Water, Steam Coils, Cooling Towers, Evaporative Condensers, Heat-X Package Chillers to 100 tons, Brunner Condensing Units to 100 tons. These are the "basics" from the Dunham-Bush line to make your Air Conditioning jobs trouble-free, simple to specify. Request catalogs by number.

1 'AH' Air Handling Units

2 'MZ' Multizone Units

3 'CR' Year 'Round Room Air Conditioners

DUNHAM-BUSH

COMFORT CONDITIONERS

4 'CC' Comfort Conditioners

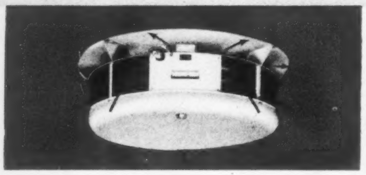
5 'CPU' Commercial Package Units

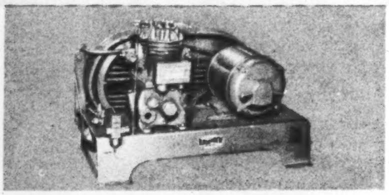
6 'PC' Package Chillers

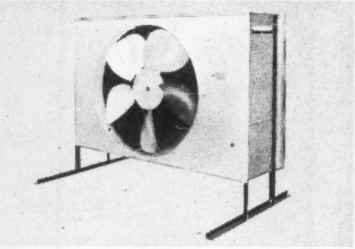
REFRIGERATION

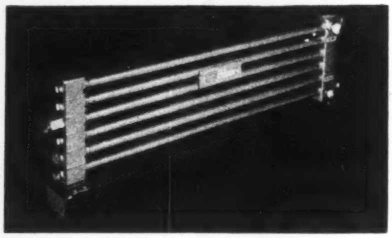
7 Brunner Consolidated Catalog

DUNHAM-BUSH ONE SOURCE..









REFRIGERATION

Normal temperature operation or low temperature operation, you'll find Dunham-Bush *the complete line*. Brunner Condensing Units, semi-hermetic from ¼ H.P. to 7½ H.P. or open-type units ¼ H.P. to 100 H.P., offer you top performance and selectivity. Dunham-Bush unit coolers, plasti-coolers,, Electric defrost, and other low temperature units, together with the full line of Heat-X liquid coolers, heat-interchangers, condensers and other important "links" for a well balanced refrigeration system, make your task simple with this "one source" line.

8 Commercial Refrigeration Products

Commercial Refrigeration Products

9 Brunner Condensing Units

COMMERCIAL REFRIGERATION CONDENSING UNITS

10 Brunner-Metic Condensing Units

PRODUCT CATALOG

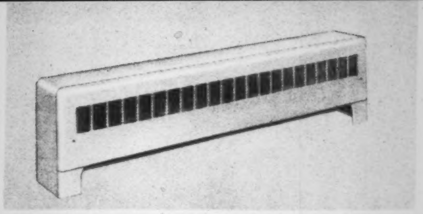
REFRIGERATION

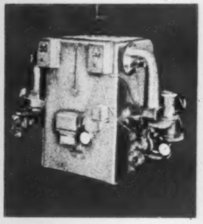
11 Brunner Consolidated Catalog

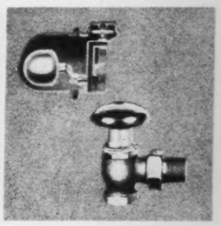
12 Compressor Racks

13 Heat-X Bulletin

14 Water Saving Units



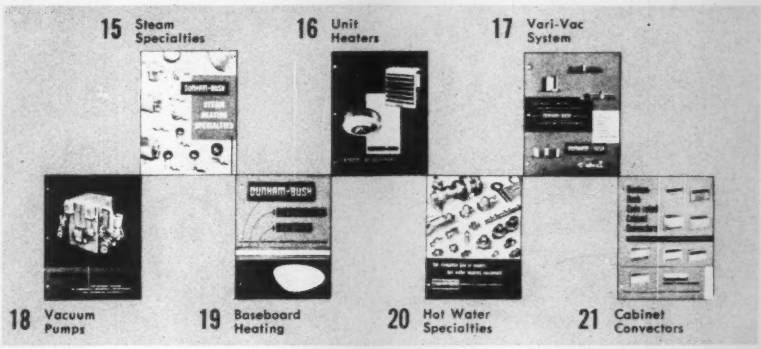




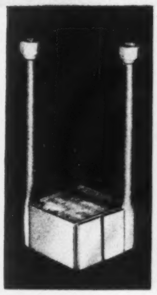
HEATING

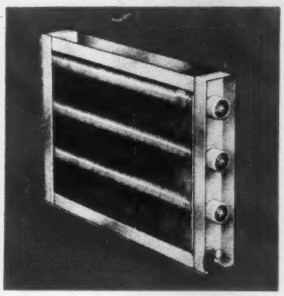
Dunham-Bush gives you "supermarket shopping" for ALL your heating needs. Not one but every heating product you need (except the boiler) is manufactured by Dunham-Bush.

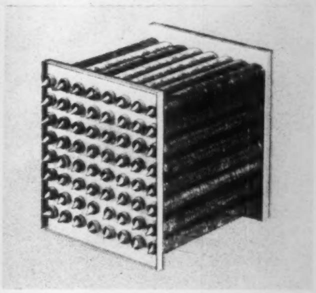
One order brings you the world's finest baseboard, convectors, radiation products, cabinet unit heaters, propeller fan and blower type heaters, vacuum and condensate pumps, complete lines of steam and hot water specialties, complete controls for industrial and home heating systems.


15 Steam Specialties
16 Unit Heaters
17 Vari-Vac System
18 Vacuum Pumps
19 Baseboard Heating
20 Hot Water Specialties
21 Cabinet Convectors

ONE RESPONSIBILITY







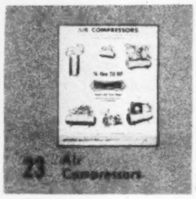
SPECIALIZED HEAT-TRANSFER

Over a century and a half of heat transfer experience is available to help solve *your* specialized heat transfer problem.

Industrial, Chemical, Aviation, Electronic—these are but a few of the fields in which Dunham-Bush engineers have exhibited their talents.

Oil Coolers, Aftercoolers, Air Compressors, LP Gas Transfer Units, specialized Inner-Fin Heat Exchangers—these are but a few of the products available in the complete Dunham-Bush line.

22 Inner Fin Bulletin


23 Air Compressors

MAIL COUPON FOR COMPLETE INFORMATION

CIRCLE CATALOGS YOU WANT

1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23

DUNHAM-BUSH, INC.
WEST HARTFORD 10, CONNECTICUT
Please send catalogs circled above.

NAME____________________

COMPANY____________________

TITLE____________________

STREET____________________

CITY______________ ZONE_____ STATE______

DUNHAM-BUSH

AIR CONDITIONING
REFRIGERATION
HEATING
HEAT TRANSFER
products on
the job
EVERYWHERE

PLEASE SERVE YOURSELF

THE MOTHER ... HIGH SCHOOL

FACTORIES

WEST HARTFORD, CONN.
Main Office and Factory
179 South Street

RIVERSIDE, CALIFORNIA
1850 Massachusetts Ave.

MICHIGAN CITY, INDIANA
506 E. Second St.

MARSHALLTOWN, IOWA
811 E. Main St.

UTICA, N. Y.
1821 Broad St.

SUBSIDIARIES

HEAT-X, INC.
Brewster
New York

THE BRUNNER CO.
Gainesville
Georgia

DUNHAM-BUSH (Canada) LTD.
140 Wendell Ave.
Toronto 15, Ontario

BRUNNER CORPORATION
(Canada) LTD.
Port Hope, Ontario

DUNHAM-BUSH, LTD.
Lombard Rd., Merton
London, S. W. 19, England

SALES OFFICES

WEST HARTFORD, CONN.
179 South Street

NEW YORK, N. Y.
250 East 43rd St.

CHICAGO, ILLINOIS
317 West Huron St.

RIVERSIDE, CALIFORNIA
1850 Massachusetts Ave.

MICHIGAN CITY, INDIANA
506 E. Second St.

MARSHALLTOWN, IOWA
811 E. Main St.

DECATUR, GEORGIA
215 Church St.

HOUSTON, TEXAS
2015 South Shepherd Drive

SAN FRANCISCO, CALIF.
760 Market Street

DETROIT 21, MICH.
16801 Wyoming Ave.

UTICA, N. Y.
1821 Broad St.

JENKINTOWN, PENN.
301 York Road

ST. LOUIS 17, MO.
2211 Brentwood Blvd.

MINNEAPOLIS, MINN.
2649 Lyndale Ave. South

TORONTO, CANADA
Dunham-Bush (Canada) Ltd.
Brunner Corp. (Canada) Ltd.
140 Wendell Ave.

LONDON, ENGLAND
Dunham-Bush, Ltd.
Lombard Rd., Merton
London, S. W. 19, England

DUNHAM-BUSH, INC., West Hartford 10, Connecticut
EXPORT DEPT: 179 SOUTH STREET, WEST HARTFORD, CONN. • CHapel 9-8671 • CABLE: BUSHEATX

Even this knife can't meet all needs

...neither can any one air filter!

Like some air filters, this knife can do many jobs. But it wouldn't be very helpful in butchering beef or clearing a canebrake. That's why they make butcher knives and machetes.

Air Filters—like knives—must be made in a wide variety of types and sizes to meet differing requirements. That's why AAF makes *all* types.

No matter what your specific needs, AAF can provide the *cleaning efficiency you need* plus the *maintenance characteristics you want.*

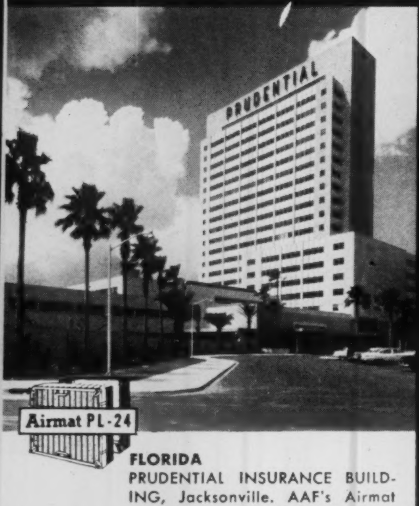
Before selecting your filters, talk with the company that *offers* a selection. Let us show you how our complete-line approach assures you of the *right* air filter installation.

AAF American Air Filter
COMPANY, INC.
herman nelson
373 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal 9, P. Q.

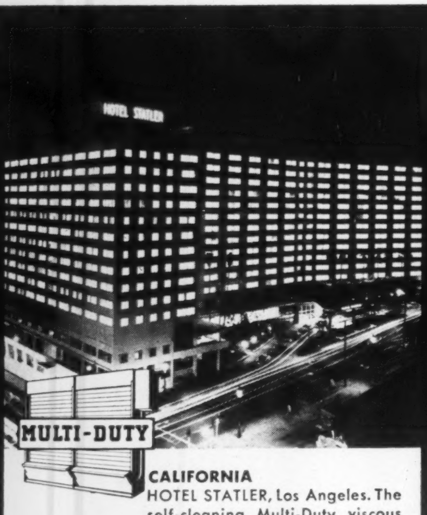
RICH'S
RICH'S
Electro-PL

TENNESSEE
RICH'S DEPARTMENT STORE, Knoxville. AAF's Electro-PL—the only filter combining dry filtration with electronic action—does the air cleaning job here. Maintenance? Periodic replacement of inexpensive Airmat paper media. Architect: Stevens & Wilkerson; Engineer: Edward E. Ashley.

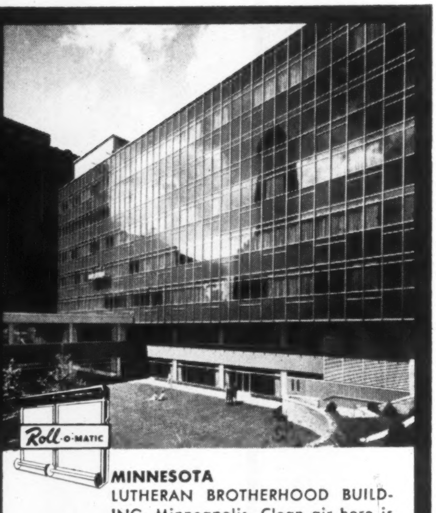
Clean Air by AAF.



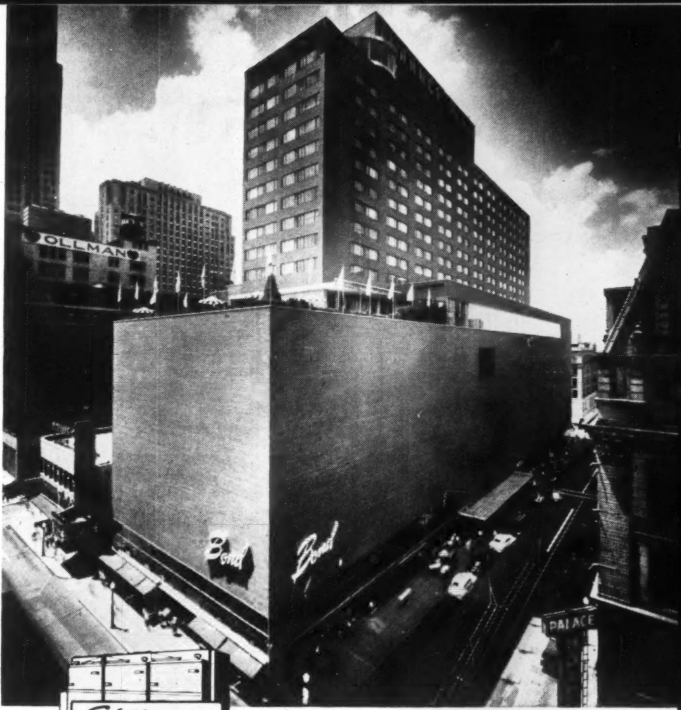
FLORIDA
PRUDENTIAL INSURANCE BUILDING, Jacksonville. AAF's Airmat PL-24 is on duty here. Periodic replacement of Airmat paper media takes care of maintenance duties. Architect: Kemp, Bunch & Jackson; Engineer: Edward Van Wagnen.



CALIFORNIA
HOTEL STATLER, Los Angeles. The self-cleaning Multi-Duty viscous filter is on the job here. Maintenance amounts to periodic removal of sludge. Architects, Engineers & Consultants: Holabird & Root & Burgee & Associates.



MINNESOTA
LUTHERAN BROTHERHOOD BUILDING, Minneapolis. Clean air here is by AAF's renewable-media Roll-O-Matic. Maintenance involves merely replacing dirt-laden media roll with a new one. Architect: Perkins & Will; Engineer: E. R. Gritschke.



OHIO
TERRACE PLAZA HOTEL, Cincinnati. Maximum cleaning efficiency with push-button maintenance . . . that's the air cleaning job being done by AAF's Electro-Cell precipitator. Architect: Skidmore, Owings & Merrill; Engineer: Jaros, Baum & Bolles.

Electro·MATIC

MASSACHUSETTS
JOHN HANCOCK MUTUAL BUILDING, Boston. Super-clean air with minimum care was the order here, and AAF'S completely automatic electrostatic precipitator—the Electro-Matic—fills the bill. Architect: Cram and Ferguson; Engineer: Buerkel & Co., Inc.

. . COAST to COAST

The buildings pictured on these two pages are thousands of miles apart—both geographically and architecturally. They differ, too, in their selection of air filters. But they do have *this* in common: *all filters are AAF filters!*

Instead of selling merely one or two kinds of filters, AAF sells *clean air,* and manufactures more than a dozen different types of filters to achieve it. From the complete AAF line, you can select the filter that gives you the *efficiency you need* plus the *maintenance characteristics you want!*

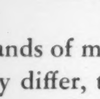
AAF—and *only* AAF—can recommend the one *right* filter for your specific requirements without compromise. Call your local AAF representative or write direct for further information.

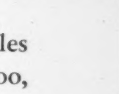
AAF American Air Filter
COMPANY, INC.
herman nelson
373 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF Dust
Control Equipment

Illinois
Heating Specialties

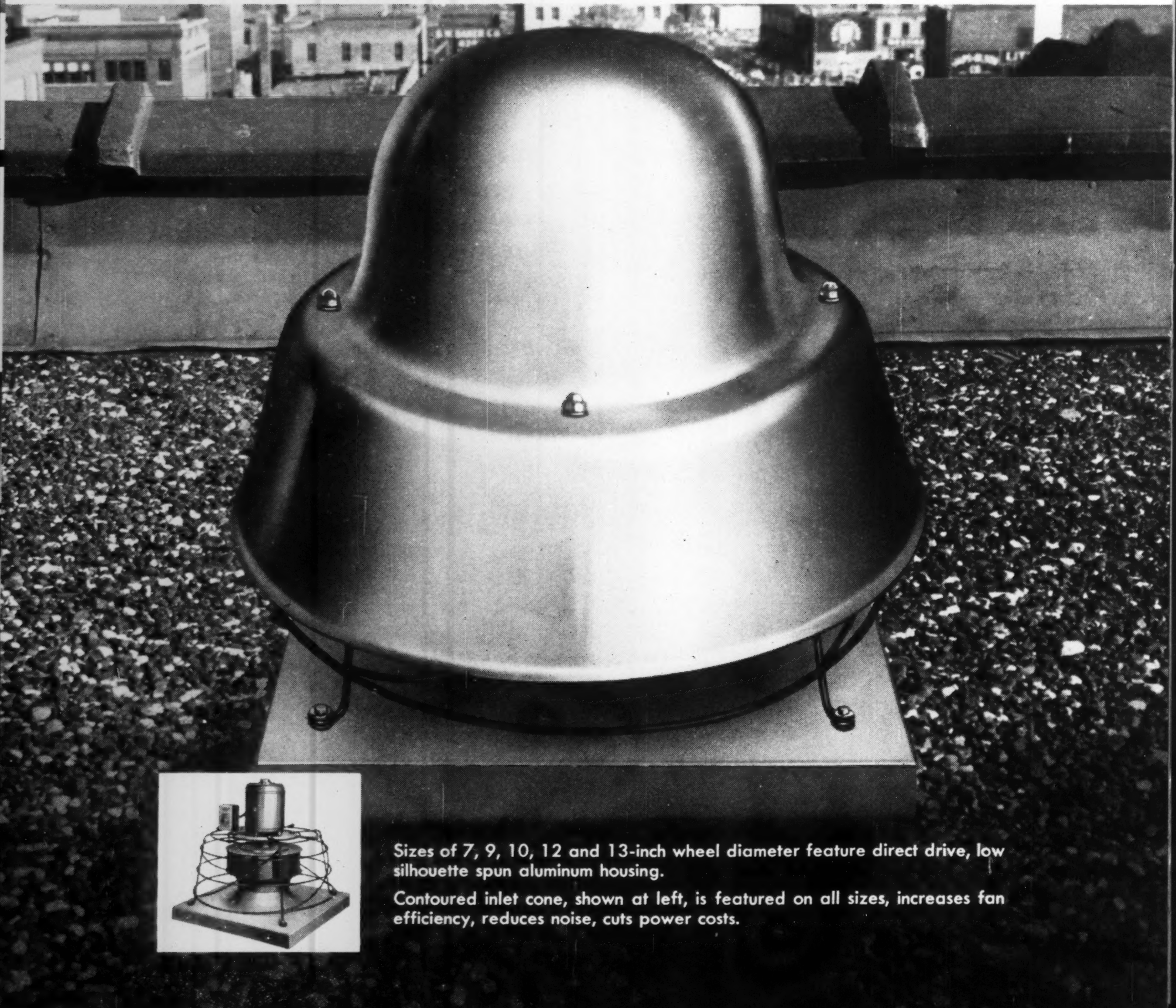
—— BETTER AIR IS OUR BUSINESS ——


Herman Nelson
Unit Heaters


Herman Nelson
Unit Ventilators

Announcing a

Trane Roof that cuts



Sizes of 7, 9, 10, 12 and 13-inch wheel diameter feature direct drive, low silhouette spun aluminum housing.

Contoured inlet cone, shown at left, is featured on all sizes, increases fan efficiency, reduces noise, cuts power costs.

new centrifugal

Ventilator power costs!

Now, 16 sizes, all with certified ratings; smooth, quiet operation, less power consumption!

Now TRANE brings you a completely new line of *centrifugal* Roof Ventilators—designed for top efficiency and economical operation, with a minimum of noise and vibration.

In 16 fan sizes from 7″ to 40″ wheel, they're streamlined, lightweight, compact, easy to install—shipped as one unit, fully assembled.

All-new design, with TRANE-made fans and scientifically contoured inlet cones give greater efficiency, more cfm with less power. Air is guided into the fan blades smoothly, efficiently, to reduce noise and eliminate power-wasting eddies.

Units feature spun aluminum housings in sizes through 22″ . . . contoured steel housings in larger sizes. In all, they offer lower silhouette, weatherproof design, laboratory-proved performance with *certified ratings*. Completely serviceable from the roof, they're easy to install because they're shipped as one unit, completely assembled.

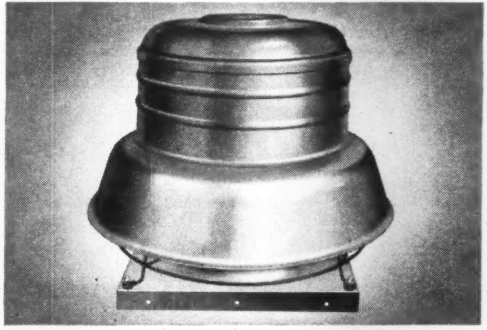
Next time you need a roof ventilator that operates with quiet efficiency against resistance, make it TRANE! TRANE Roof Ventilators cost no more than many units without these quality features. Call your nearby TRANE Sales Office for complete facts on TRANE Roof Ventilators . . . Unit Heaters . . . Self-Contained Air Conditioners . . . Fans, Coils and Steam Specialties. Or write TRANE, La Crosse, Wis.

For any air condition, turn to

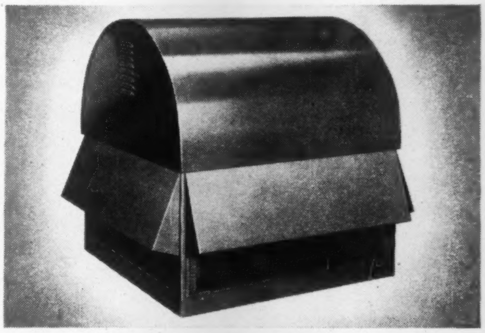
TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 96 U.S. AND 19 CANADIAN OFFICES



Sizes of 15, 16, 18, 20 and 22-inch wheel diameter are either direct or belt-driven; feature low silhouette spun aluminum housing.



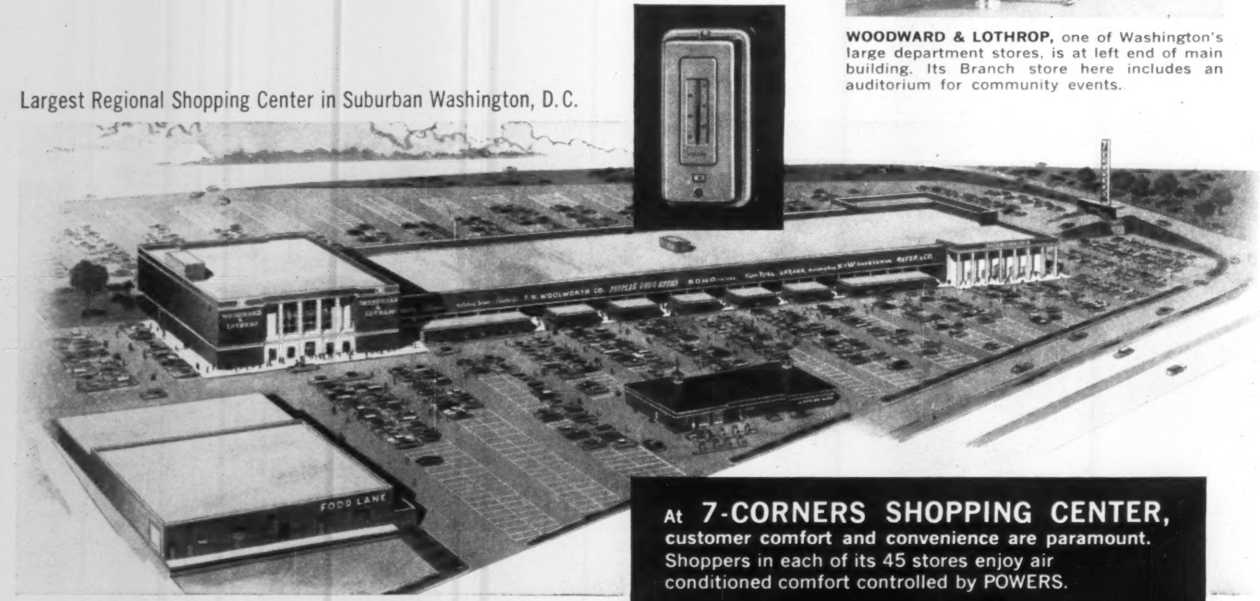
Sizes of 24, 27, 30, 33, 36 and 40-inch wheel diameter are belt-driven models. Steel housing is arched for low silhouette.

POWERS AIR CONDITIONING CONTROL helps make sales

...in leading shopping centers and stores

SILVERWARE

WOODWARD & LOTHROP, one of Washington's large department stores, is at left end of main building. Its Branch store here includes an auditorium for community events.



Largest Regional Shopping Center in Suburban Washington, D.C.

At 7-CORNERS SHOPPING CENTER, customer comfort and convenience are paramount. Shoppers in each of its 45 stores enjoy air conditioned comfort controlled by POWERS.

Owners: **Garfield I. Kass and Irving D. Berger**
Designed and constructed under the direction of
J. Franklin Groff, Kass Realty Co., Inc., Washington, D. C.
Consulting Engineers: **Kluckhuhn, Cobb and McDavid**
Mechanical Contractor: **R. M. Thornton, Inc.,**
Carrier Corp. Equipment and Air Conditioning Units.

Unique Heating and Cooling Features at 7-Corners

Ingenious technical and design features make 7-Corners Shopping Center outstanding for efficient, economical operation and low cost maintenance. For example . . .

a) High temperature forced hot water at 250°F is accurately metered for each store, see photos opposite page.

b) Condenser water for entire shopping center is processed in a 3000 ton Cooling Tower built under the Food Lane Super Market. This space also serves as a Retention Basin for storm water and permits use of rain water for condenser cooling for all refrigeration.

c) Conventional Powers Control system regulates central fan systems and refrigeration compressors.

d) Snow-melting for ramps, at both ends of delivery truck tunnel to tenant loading docks and domestic water heaters, also are Powers Controlled.

Solving the many temperature, humidity and pressure control problems here exemplifies the engineering skill available at Powers and the versatility of Powers control to handle a wide range of requirements.

For Your New Building, be it a school, factory, hospital, church or commercial building—ask your architect to include a Powers Quality System of Temperature and Humidity control. Its unmatched dependable operation pays a big return on the control investment.

OTHER PROMINENT USERS OF POWERS CONTROL

Northland Shopping Center near St. Louis
Old Orchard Shopping Center near Chicago
Gulfgate Shopping Center near Houston
Famous-Barr Stores, St. Louis, Mo.
Gimbels, in Cheltenham, Philadelphia and Upper Darby, Pa.
Macy's, Roosevelt Field Shopping Center and Kansas City, Mo.
I. Magnin and Company, Los Angeles, Cal.
Nieman - Marcus Co., Dallas, Texas
Rich's, Atlanta, Georgia
Sakowitz Bros., Houston, Texas
Saks Fifth Avenue, New York - White Plains
Sears, "Worlds largest store", many large stores in U.S.A. and Latin America
John Wanamaker Stores in Wynnewood, Pa., Baederwood, Pa., Wilmington, Del.

CANADA: T. Eaton Co., Ltd., 6 Stores • Robert Simpson Co., Ltd., and Simpson-Sears, Ltd., 12 Stores • Dupuis Freres, Montreal

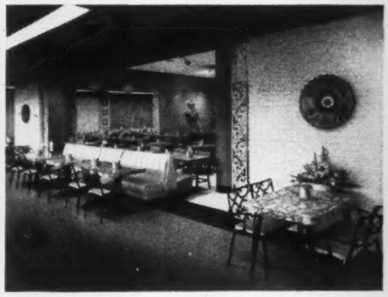
(c52)

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 Years of Temperature and Humidity Control

JULIUS GARFINCKEL & CO., famed fashion institution in the Nation's Capital, occupies the large Colonial style store at the right end of the Main Building.



S & W RESTAURANT, one of its 12 fine eating places in the South, helps draw people to the center with its excellent food and attractive decor.

MAYER & COMPANY, outstanding furniture store occupies a prominent place in the 7-Corners Shopping Center and it offers a complete decoration service.

7 CORNERS
6:15
SHOPPING CENTER

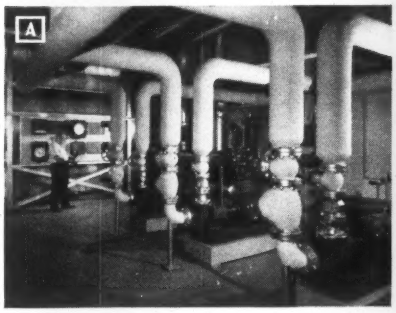
Sign Flashes Weather Signals and Time

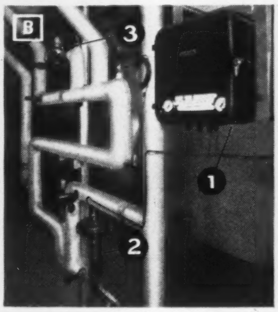
New Landmark in Fairfax County, Va.

WOOLWORTH'S
BARBER SHOP

COMPACT SPLIT LEVEL DESIGN reduces the distance shoppers must walk from their cars to stores. Two covered promenades, each over 600 ft. long, protect shoppers from inclement weather. All 45 stores are on main line of traffic between 2 department stores.

Below: **POWERS BTU Metering Control for Each Store.** Photo A shows instrument panel with Powers circulating pump control for high temperature forced hot water heating. Powers control automatically starts and stops the pumps as the load changes. Photos B & C show Powers control employed for BTU heat meter service. B for small stores and C for larger stores.

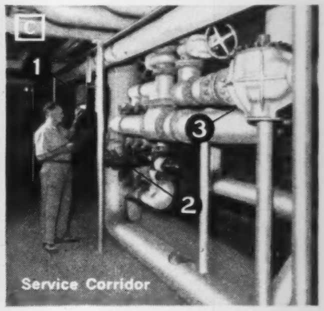




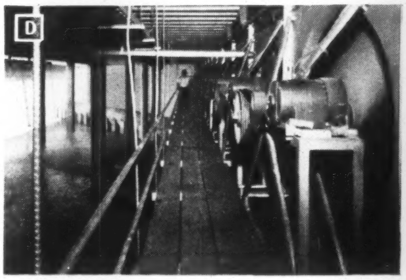
(1) Powers Indicating Heat Meter.

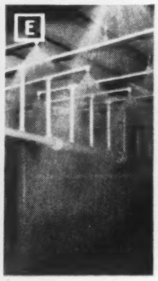
(2) Powers Flowrite Control Valves.

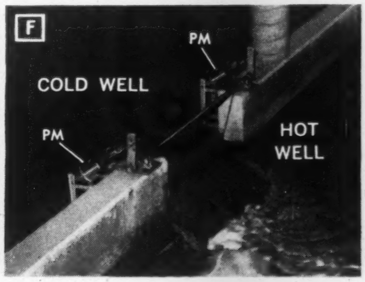
(3) Registering Water Meter.

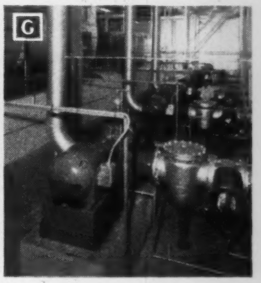


Below: **Cooling Tower under Food Lane Supermarket:** Photo D shows air intake, portion of retention basin and bank of fans; E shows water sprays; F shows one of two by-pass gates thermostatically controlled by four 6" POWERSTROKE pneumatically operated motors PM; G shows circulating pumps supplying condenser cooling water to air conditioning units throughout the Shopping Center.

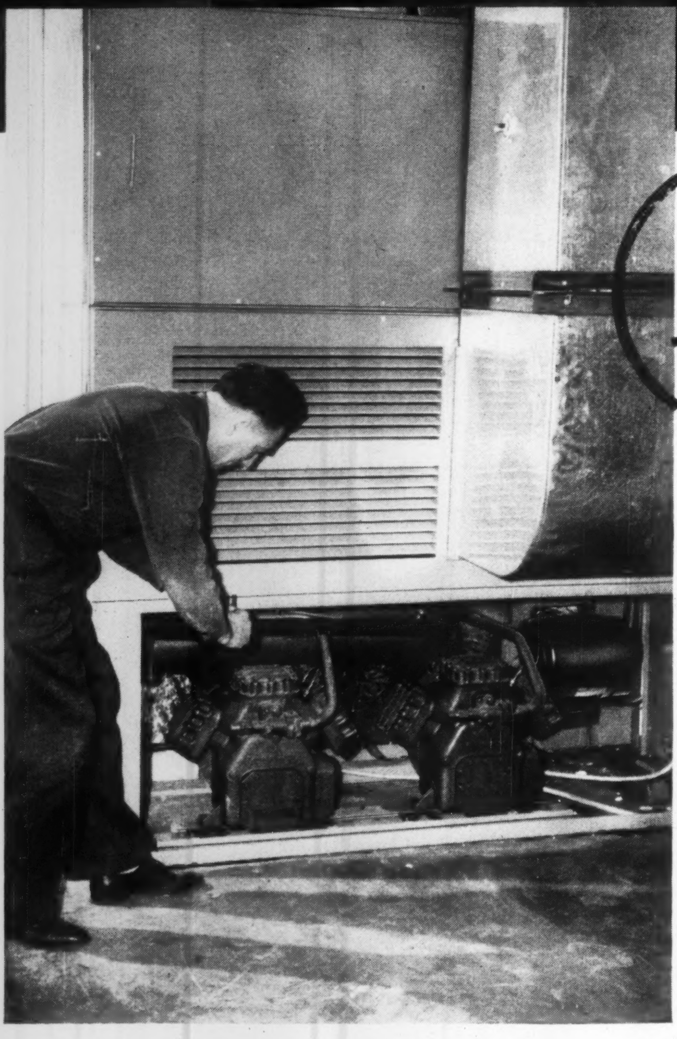






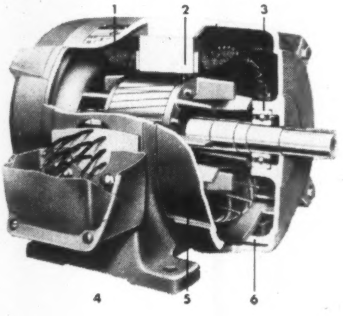


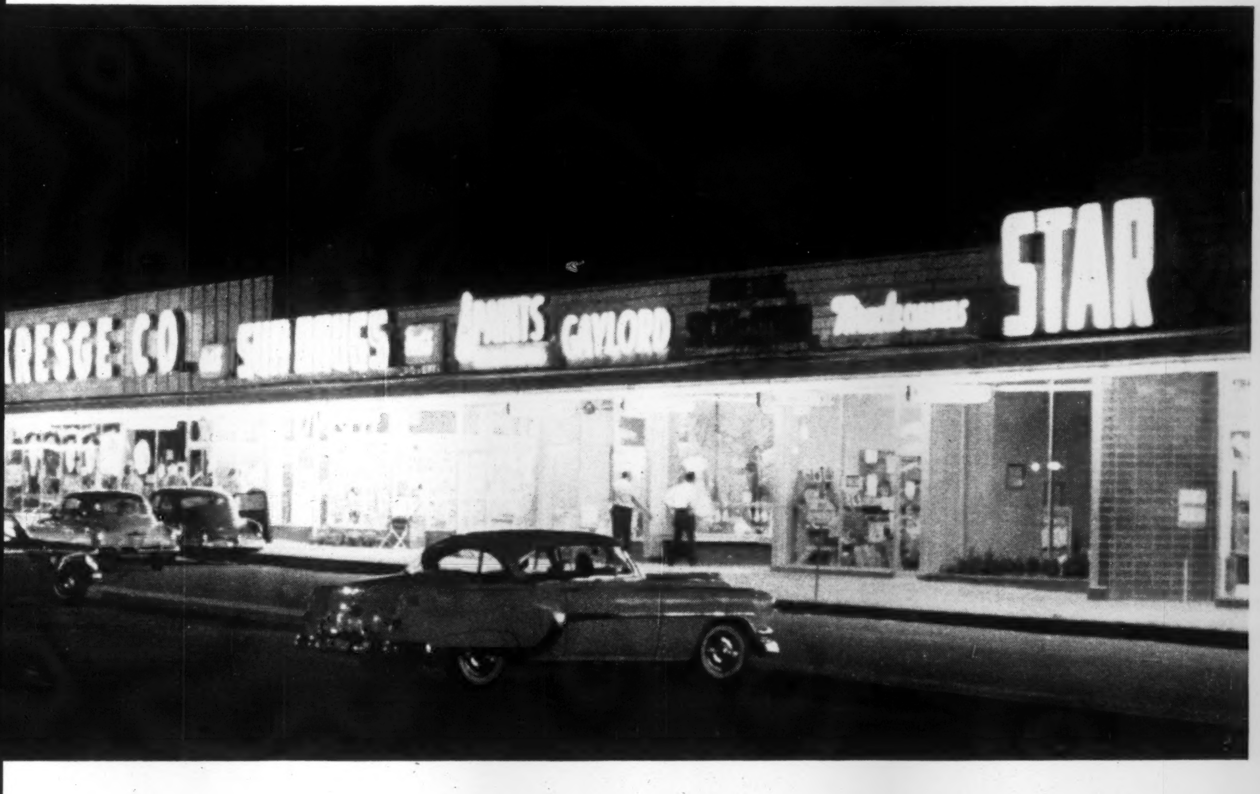
FALLER FURNITURE



JOB TESTED

1. Fortified insulation lasts longer; resists moisture, oils and chemicals **2.** Unitized stator gives better electrical performance **3.** Pre-lubricated bearings eliminate on-the-job greasing **4.** Precision manufacturing produces smooth, quiet operation **5.** Armorized frame shrugs off physical abuse, stands up to attacks of foreign elements **6.** Drip-proof ventilation gives complete protection *regardless* of mounting position.





Westinghouse *Life-Line A* motors customer approved for air conditioning

Westinghouse Life-Line® "A" motors have been thoroughly tested in tough air conditioning jobs throughout the country . . . and proved *outstanding* for rugged performance, dependability and extremely quiet operation.

Precision manufacturing and dynamic balancing of this Westinghouse motor have produced the quietest operating unit available. Tests in soundproof laboratories prove this Life-Line "A" motor produces an operating sound level lower than other standard motors.

Armorized frame provides rigidity to prevent armature misalignment even with heavy shaft loads . . . protects motor from physical abuse and contamination. Ventilation openings in the end brackets make the Westinghouse motor *completely* drip-proof, regardless of mounting position. Life-Line "A" 4-way sealed, prelubricated bearings keep grease in . . . dirt and water out . . . eliminate on-the-job greasing in out-of-the-way applications.

For complete information, call your local Westinghouse distributor or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-22004

YOU CAN BE SURE . . . IF IT'S Westinghouse

Air Conditioning Control at

CONVAIR–HOME OF THE

Johnson Pneumatic Control System Solves the Varied Temperature Regulation Problems of One of the World's Largest Air Conditioned Industrial Plants

Convair's impressive record in aircraft production was highlighted recently by the design, development and, now, the production, for the United States Air Force, of the nation's first supersonic bomber, the Convair B-58 "Hustler".

PROBLEMS ARE COMPLEX

Accurate control of thermal conditions for this and other vital work is provided by a Johnson Pneumatic Temperature Control System. The multi-building Convair-Fort Worth plant, one of the world's largest, poses a variety of intricate temperature regulation problems due to its enormous size, diversified usage requirements, the types and number of systems controlled and wide load variations within, as well as among the various buildings.

USE REMOTE RESET

Largest of the buildings is the 4,000-foot-long Assembly Building which is air conditioned by large built-up systems using hot and chilled water. Control in the windowless structure is accomplished by Johnson remote readjustable thermostats in the spaces operating face and bypass dampers, outdoor and return air dampers and water valves on the coils. Six 1,000-ton refrigeration machines are installed for this one building alone.

A key feature of the pneumatic control system is a central control panel which greatly simplifies the control work and provides the flexibility needed to heat, cool and ventilate the buildings efficiently.

PNEUMATIC OFFERS ADVANTAGES

Countless leading buildings, of all types and sizes, are equipped with Johnson Pneumatic Temperature Control Systems. Whether your particular problems involve comfort conditions or protective temperatures and humidities for products and processes, pneumatic control meets every requirement. It's simpler by far than any other method of control —requires fewer components, is easier to operate and maintain, offers the widest choice of operating features.

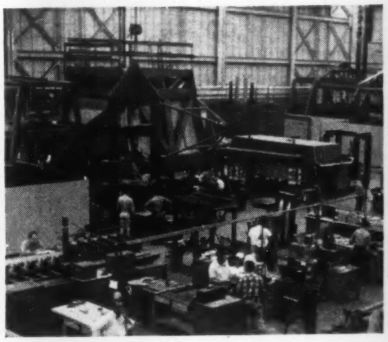
A nearby Johnson engineer will gladly explain how these advantages can be applied to your problems. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

Convair Division, General Dynamics Corporation, Fort Worth, Texas. Besides the huge Main Assembly Building, other buildings with Johnson Pneumatic Control include the Development, Radar, Experimental and Flight Test Buildings and Test Laboratories A and B.

"HUSTLER"
50660

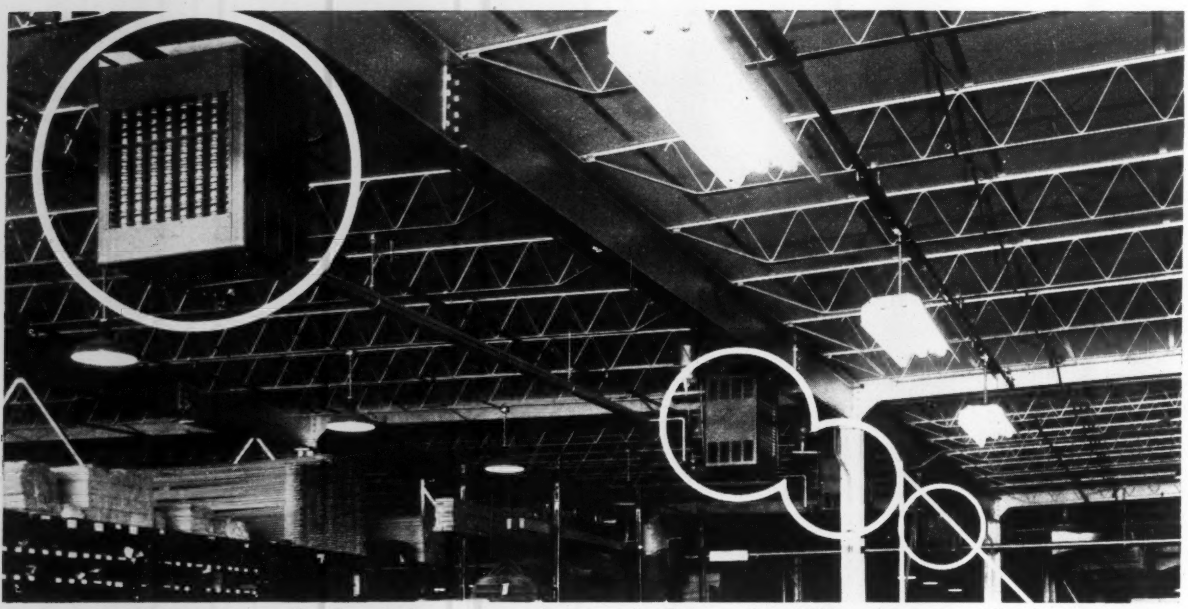
. . . Engineering

. . . Testing



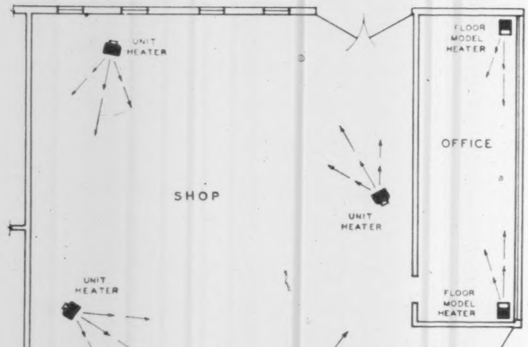
. . . Assembly

JOHNSON CONTROL
PNEUMATIC SYSTEMS
DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885



OVER 700 JANITROL gas-fired unit heaters are in service at International-Harvester plants. Trouble-free performance and fast heating response are big reasons why International-Harvester respecifies Janitrol units, time after time. Unit heaters shown are in International-Harvester's Denver plant.

LEADING INDUSTRIES ON JANITROL...ADD



FLOOR PLAN showing typical Janitrol Unit Heater Installation.

Their versatility and efficiency, combined with low cost, make Janitrol unit heaters the foremost choice for heating most every industrial or commercial building. Uses include:

COMPLETE HEATING of an entire building in place of a central system, with savings up to 50%.

SPOT HEATING areas needing additional or seasonal heating. Janitrol units pinpoint flow of heat to areas requiring it.

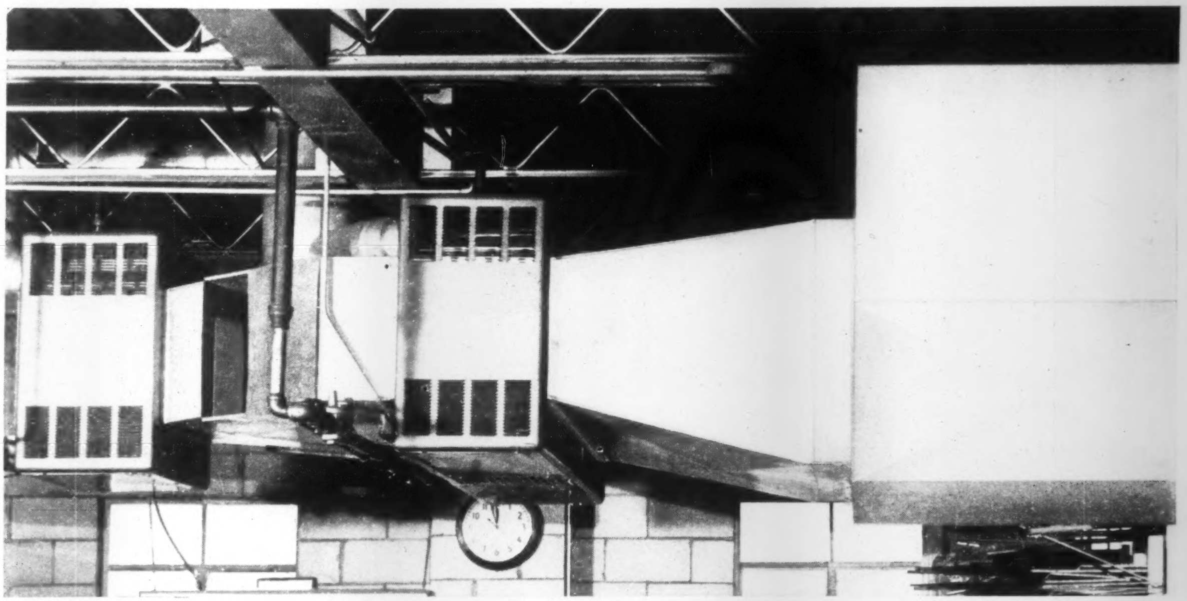
SUPPLEMENTAL HEATING for plant additions, etc., where present heating capacity is not sufficient to handle the extra area.

Installation is fast and easy. No floor space needed. Versatile "dual fuel" performance—use natural or LP gas; may be switched from one fuel to the other, automatically.

As for long life and low maintenance, let this fact guide you. Less than ¼ of 1% of over two million heat exchanger tubes produced for Janitrol's exclusive Multi-Thermex heat exchanger have required replacement for any cause!

ARCHITECTS' AND ENGINEERS' INFORMATION SERVICE

Write today for complete A. I. A. files on heating with gas in big buildings of every type, and for Janitrol specifications service. There's no obligation.



AT FREMONT TOOL & DIE COMPANY, Fremont, Ohio, drafts caused by exhausting the warm air were eliminated by bringing in outside air and "tempering" it with Janitrol Duct Heaters. Thrifty, year 'round office comfort results from using the same duct system for summer cooling and winter heating. Unit heater blowers provide effective plant ventilation during the summer months.

STANDARDIZE TO PROFITS

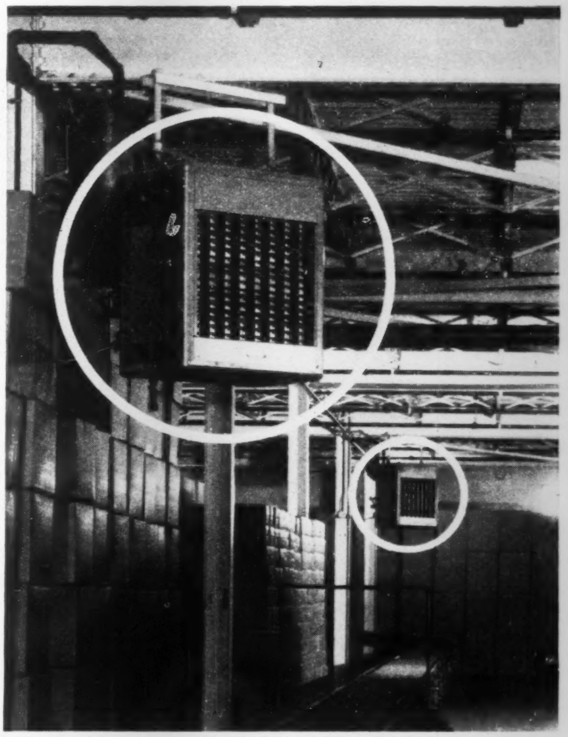
Look into Janitrol gas-fired unit heaters for your next job. Our engineers will gladly work with you in developing complete specifications. Call your Janitrol office, or write Janitrol Division, Columbus 16, Ohio.

Winter conditioners adaptable for summer cooling

. . . with installation of Janitrol's new air-cooled cooling system that uses no water, eliminates water service and maintenance costs. May be installed concurrently with winter conditioner, or any time later, without additional ductwork.

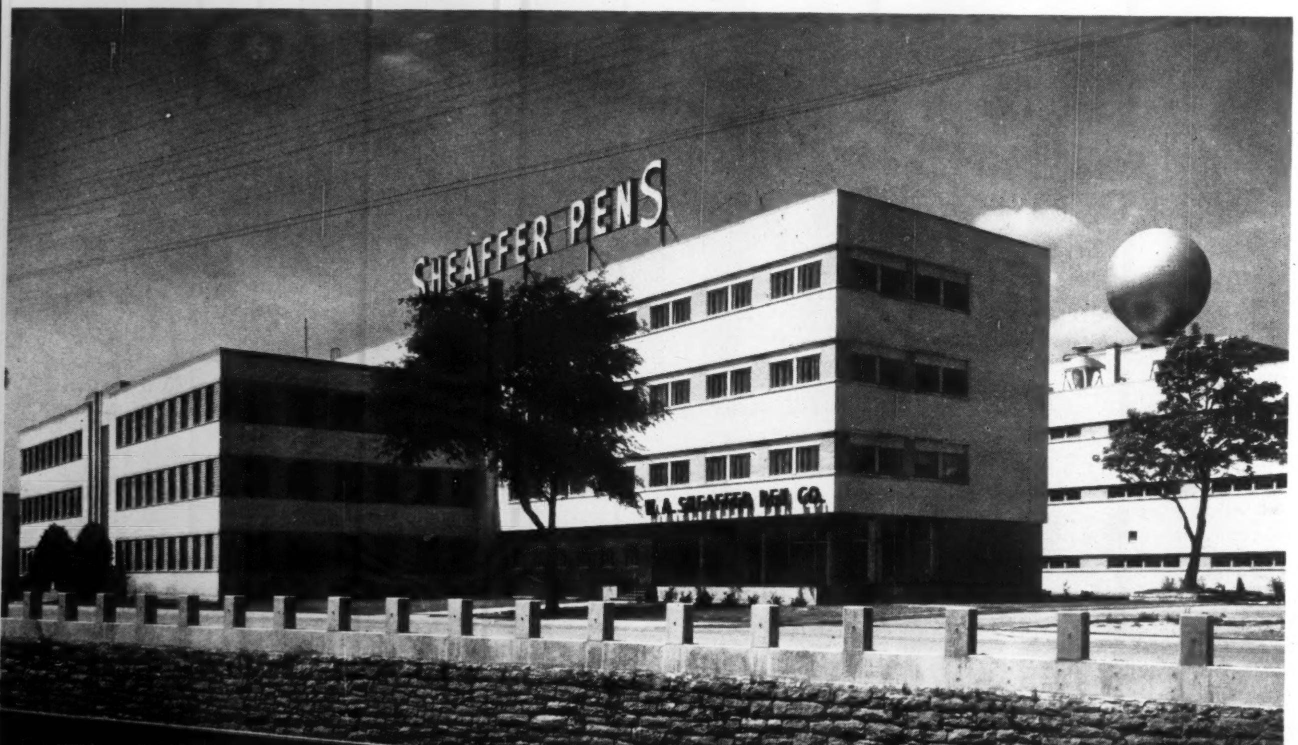
JANITROL®

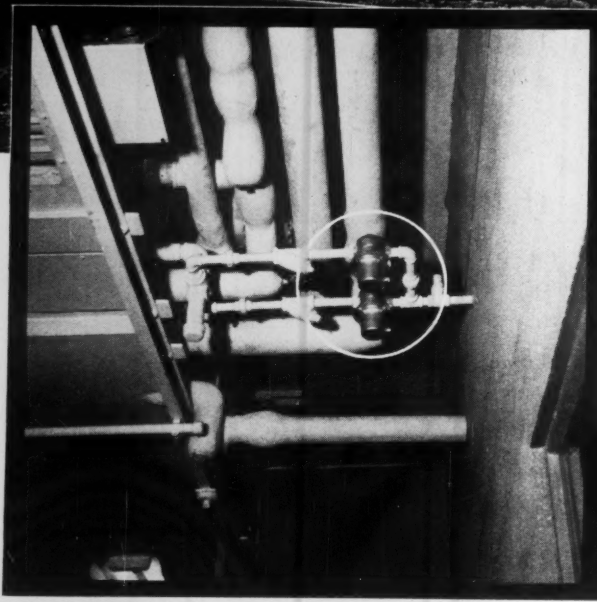
JANITROL HEATING & AIR CONDITIONING DIVISION
SURFACE COMBUSTION CORPORATION
COLUMBUS 16, OHIO
IN CANADA: MOFFAT HEATING & AIR CONDITIONING DIVISION
MOFFATS, LTD., TORONTO 15
Also Makers of Surface Industrial Furnaces, Kathabar Humidity Conditioning, Janitrol Residential Heating and Cooling Equipment.



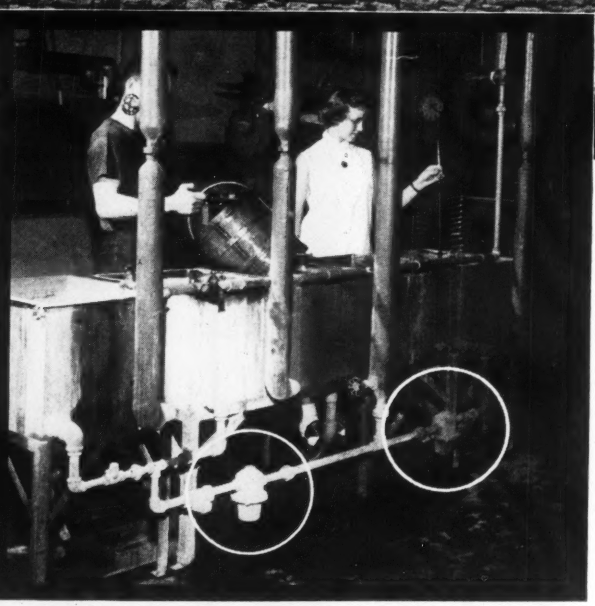
AT THE OHIO ART COMPANY'S plant with over 293,000 square feet of floor space for manufacturing and warehousing, 77 Janitrol unit heaters supply clean, automatic gas heat. As this company's toy manufacturing business grew, additional Janitrols were economically added to keep pace with heating needs. The company says maintenance on their Janitrol units is virtually zero.

illinois TRAPS CUT FUEL AT SHEAFFER





BUILDING HEATING. Here are two of the Illinois traps at the Sheaffer plant. A switch to Illinois resulted in perfect comfort temperatures and a reduction of more than one fourth in fuel consumption.



PROCESSING. Plant Engineer John Manshein reports that Illinois traps were the *only* traps among those tested that could function properly on these plating tanks.

BILL 25%
PEN COMPANY PLANT!

Sheaffer Pen Company, Fort Madison, Iowa. Designed and constructed by The Austin Company.

Plant engineer's tests prove Illinois superiority in both building heating and processing operations

THE PROBLEM

After Sheaffer Pen Company built its modern, air conditioned plant at Fort Madison, Iowa, Plant Engineer John Manshein encountered heating problems. He found that some areas of the building could not be brought up to comfortable temperatures.

WHAT WAS DONE

First, Mr. Manshein made a thorough investigation. As a result of this, he ordered six traps from various manufacturers and put them through his own rigid testing program.

RESULT

These tests led to the installation of Illinois traps throughout the building. *During the following heating season, the building was perfectly comfortable and fuel consumption dropped more than one-fourth!*

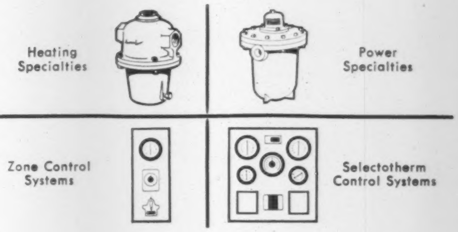
Processing, Too!

Mr. Manshein conducted his own tests, also, on traps serving the plant's many plating, wash and rinse tanks with the same result—a switch to Illinois. He says that Illinois traps were the *only* traps among those tested that could take the very rapid valve openings and closings for prolonged periods.

Select from a complete line of thermostatic traps, float and thermostatic traps and steam traps—25 inches vacuum to 600 lbs. pressure. Write for Bulletin 110 today.

illinois ENGINEERING

Illinois Engineering Company
2035 S. Racine Ave., Chicago 8, Ill.
A Division of American Air Filter Company, Inc.



ACCO
for Better Values

THE COMPLETE LINE—

R-P&C VALVES

DESIGNED FOR DEPENDABILITY

R-P&C FORGED STEEL GATE VALVES ARE NOW IMPROVED TO GIVE EVEN BETTER SERVICE

R-P&C Forged Steel Gate Valves, developed specially for the power, petro-chemical and process industries, are now better than ever. These dependable valves have been improved for greater safety, better performance and longer service life.

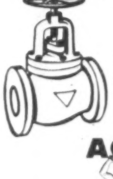
Illustrated above is a general purpose valve of the 800 Series; it is rated at 2500 PSI at 100° F., or 800 PSI at 850° F., and is furnished in eight sizes from ¼″ to 2″. It is available with either screw (F-56) end or socket weld (F-57) end, and with conventional and full port openings. Also available in flanged ends with conventional port openings in 150, 300 and 600 lb. with A.S.A. standard flanges and A.S.A. standard face to face. For details, write for Booklet DH-80.

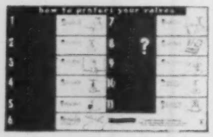
The R-P&C Line is Complete

Whatever your valve requirements may be, *look first to your R-P&C Distributor*. The R-P&C Valve line includes gate, globe, angle and check valves in all standard valve materials—bronze, electric iron and cast steel, as well as the forged steel line described above. An exceptionally wide range of styles, sizes and pressure classes is available. In addition, R-P&C offers a full line of cast steel fittings, also specialties such as asbestos-packed cocks, bar stock valves, Lubrotite gate valves and other items. Order through your R-P&C Distributor. For complete R-P&C catalog, write our Reading office.

BAR STOCK VALVE

BRONZE GATE VALVE

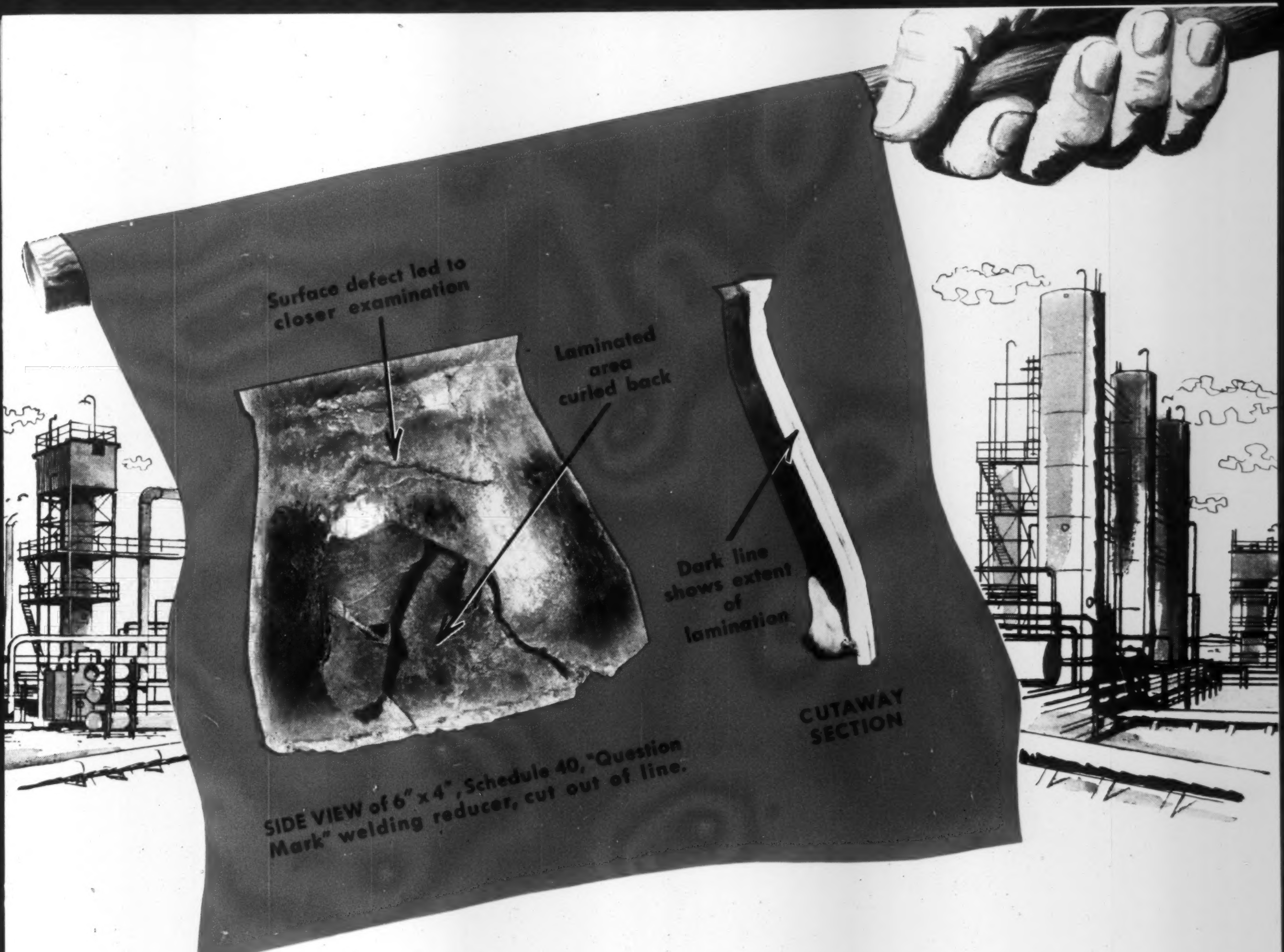

IRON GLOBE VALVE



FREE WALL CHART
"How to Protect Your Valves"
Installation pointers, operating tips, clues to longer valve life. They are all on this 22″ x 17″ wall chart. Write for your free copy.

R-P&C VALVE DIVISION
AMERICAN CHAIN & CABLE
Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO
TRADE MARK


Surface defect led to closer examination
Laminated area curled back
Dark line shows extent of lamination
CUTAWAY SECTION
SIDE VIEW of 6" x 4", Schedule 40, "Question Mark" welding reducer, cut out of line.

Watch out for the after-costs of *Question Mark* fittings!

Unknown fittings may look like a bargain on the price tag, but watch out for the consequences!

Surface defects led to the above "Question Mark" fitting being cut from the piping. Further examination showed the steel inside was laminated. Pieces cut out literally fell apart. Here was an open invitation to serious trouble . . . lost production, wasted dollars and possible human casualties.

This is another example of a dangerous situation posed by unknown fittings of questionable quality . . . a serious threat to the safety and economy of well-engineered piping.

You can avoid these risks by specifying KNOWN fittings!

DANGER! *Your first warning of Question Mark fittings is their lack of complete, permanent identification of manufacturer, wall thickness, weight, material . . . as required by A.S.A. code.*

A message in the interests of top quality piping
. . . by Tube Turns, Louisville, Kentucky

YOUR SAFEGUARD

tt
TUBE-TURN
TRADE-MARKS
4X6
WPB
SCH 40

Safeguard your piping investment with known fittings!

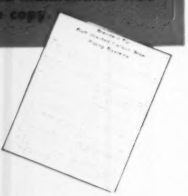
TOP QUALITY! *Directional and size changes in this process piping are made with* TUBE-TURN *Welding Elbows and Reducers . . . recognized for their unsurpassed uniformity and quality.*

The cost of fittings is a small fraction of the total cost of a piping system. To buy "cheap" fittings and run the risk of impairing the performance of your entire system can, therefore, be "penny wise and pound foolish."

When you specify and buy TUBE-TURN* products, you know your investment is safeguarded by unsurpassed quality of fittings and flanges. They meet all American Standard and Safety Code requirements. Each product is permanently marked with complete size and material designation.

COMPLETE LINE! *Your nearby Tube Turns' Distributor gives you prompt delivery from the complete line of more than 12,000 Tube Turns' stocked items. Photo courtesy The Ross-Willoughbby Co., Columbus, Ohio.*

STANDARD for Butt-Welded Carbon Steel Piping Systems. Covers materials, assembly methods and welding procedures to use for safe, economical and maintenance-free piping. Mail the coupon for your free copy.



TUBE TURNS, Dept. A-9
224 East Broadway, Louisville 1, Kentucky

Please send new Standard for Butt-Welded Carbon Steel Piping Systems.

Company Name ______________________
Company Address ______________________
City ____________ *Zone* ____ *State* ______
Your Name ______________________
Position ______________________

Available from your nearby TUBE TURNS' distributor

*"TUBE-TURN" and **"tt"** Reg. U.S. Pat. Off.

TUBE TURNS

A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland • Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle
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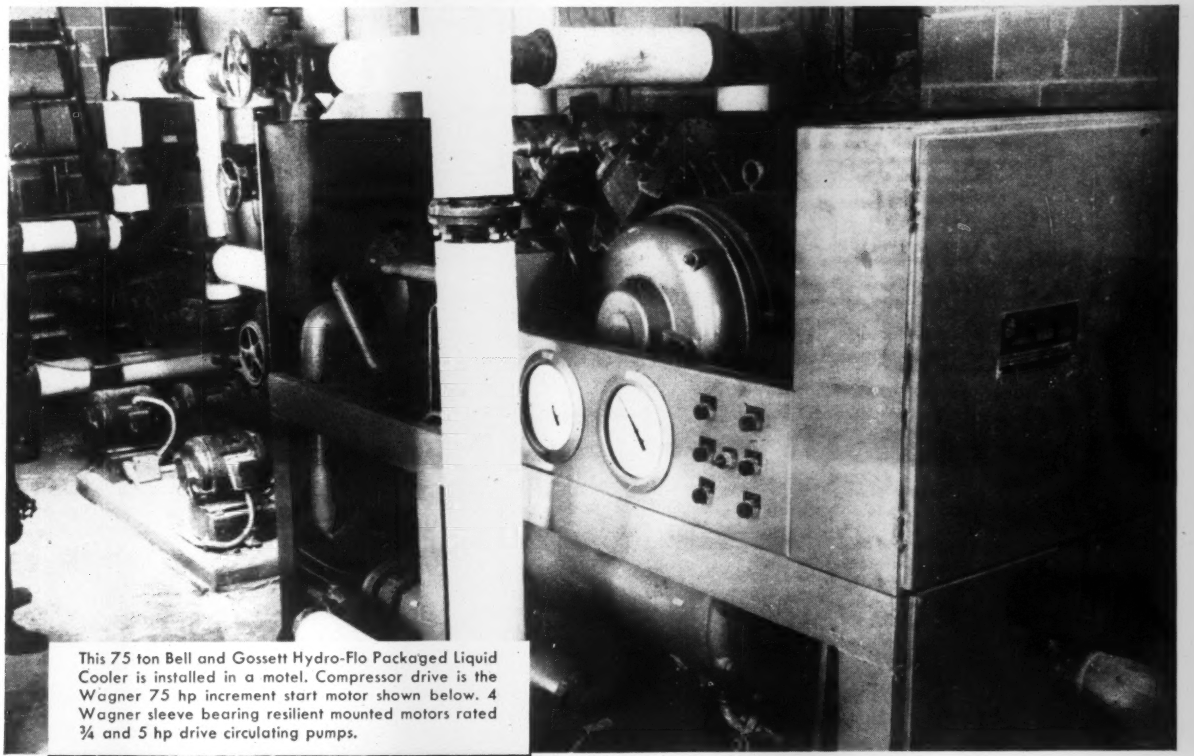
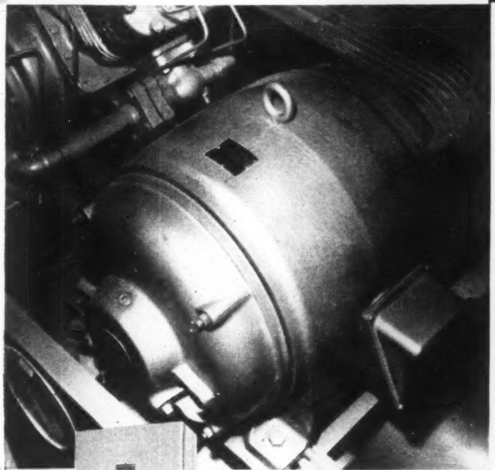
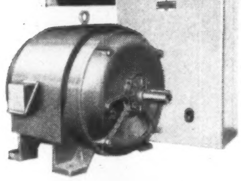
WAGNER ELECTRIC MOTORS . . . THE CHOICE OF LEADERS IN INDUSTRY



This 75 ton Bell and Gossett Hydro-Flo Packaged Liquid Cooler is installed in a motel. Compressor drive is the Wagner 75 hp increment start motor shown below. 4 Wagner sleeve bearing resilient mounted motors rated ¾ and 5 hp drive circulating pumps.





Wagner two-step combinations suit most applications. For installations where unusually low inrush of starting current is required, Wagner can furnish 3, 4, 5, or 6 step increment motor-starter combinations.

WAGNER

Increment Motor-Starter Combinations limit inrush of current when starting big motors

Part-winding starting is a good low-cost way to limit inrush of starting current on large squirrel-cage motor installations. Wagner Increment Motor-Starter Combinations permit such starting—meet all polyphase motor starting recommendations of AEIC—EEI—NEMA—and provide many years of troublefree operation.

These Wagner motor-starter combinations are not bulky, are easy to install, and are *proven* efficient and dependable in operation—Wagner has been supplying these combinations for over 17 years.

Why don't you investigate Wagner Increment Motor operation? Ask your nearby Wagner engineer to take you to an installation in your area. See how it works—judge for yourself, and then let him help you select the combination that meets your requirements. Call the nearest of our 32 branch offices, or write for Bulletins MU-128 and MU-195.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

M57-14

VISIT US AT BOOTH 672 — 10TH EXPOSITION, AIR CONDITIONING & REFRIGERATION INDUSTRY

Specially designed for medium sized burners—

NEW HONEYWELL R4074B

Offers the speed and safety of Electronics

THE NEW Honeywell R4074B Protectorelay is specially designed to meet the flame supervision requirements of medium to smaller type installations—*at less expense.*

This is vital, for under new U. L. requirements, oil, gas and combination burner systems must offer four-second response timing and 15-second trial for main flame ignition on start-up. Conventional devices can't do this. *The Honeywell Protectorelay line can.* For it—and only it—offers the sensitivity, speed and safety of Honeywell electronics backed by Honeywell experience.

Check these outstanding features of the new Honeywell R4074B Protectorelay

- **Electronic Safety Start**—A Honeywell exclusive—means an automatic self-check after any power interruption, regardless of length or cause, before burner can be restarted. In addition, regular Safe-Start Check after each shutdown provides safe restart.

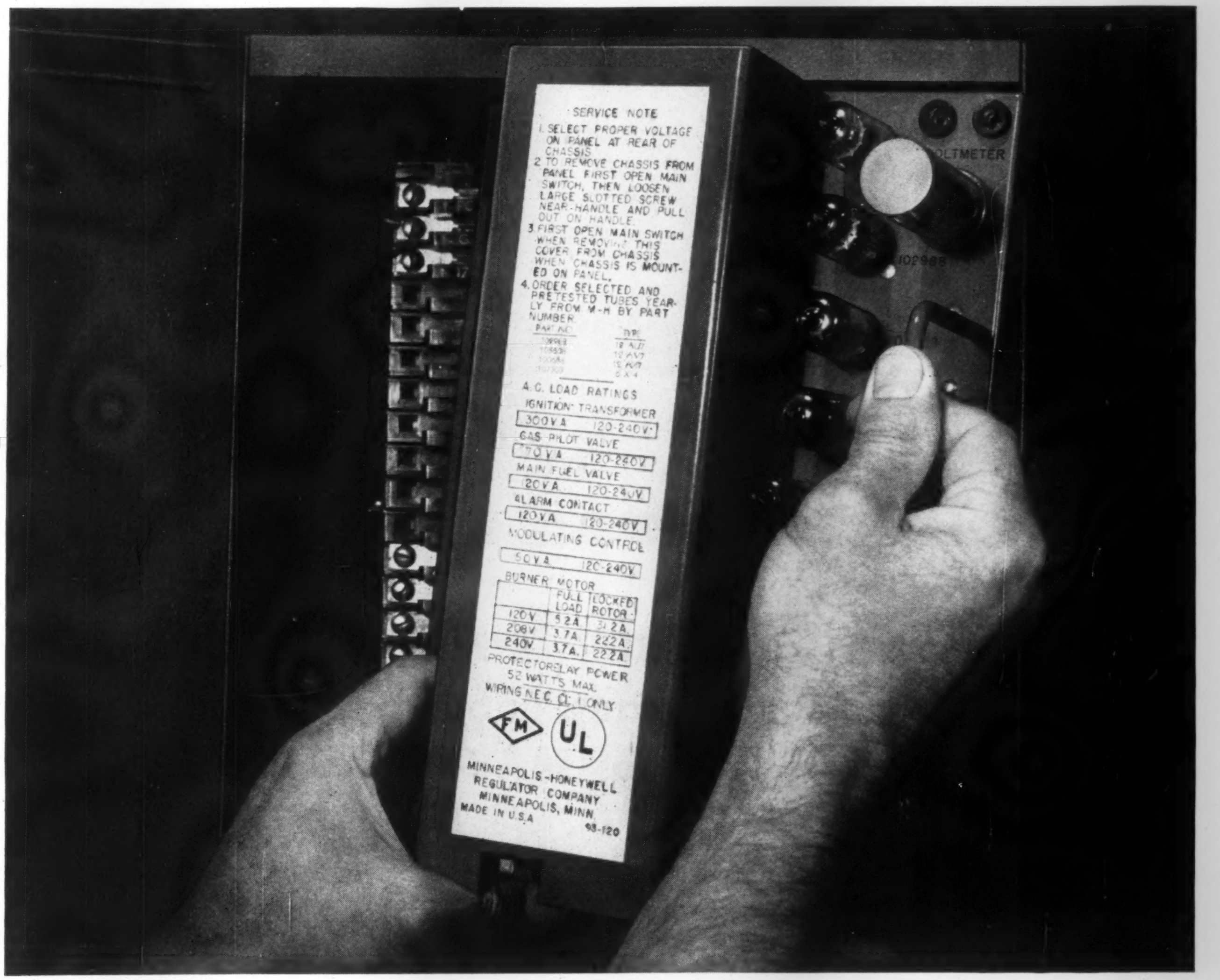
- **Electronic flame detection**—fast and sensitive. R4074B uses Honeywell's Flameguard (lead sulphide) Photocell; responds *instantly* to flame failure.

- **Electronic timing**—dependable, uniform. R4074B features simple sequencing flexibility with reliable electronic timing for pre-purge, post-purge and ignition timing. Vacuum tube rectifiers assure uniform timing.

**Trademark*

- **Sequencing engineered for maximum safety** • Pre-purge period of 30 seconds • Selectable interrupted or intermittent pilot • Ignition timing, 15 seconds • Safety Switch timing, 15 seconds • Selectable flame supervision—pilot and main flame, or main flame only • Provision for opening main fuel valve either after proof of pilot, or at end of pre-purge cycle. • Safe-Start Interlocks permit installation of low-fire, oil temperature and air flow interlock features. • Post-purge 15 seconds after normal burner shutdown.
- **Wide selection of voltage**—120, 208 or 240-volt 60 cycle applications. Also 50 cycle model.
- **Economical**—Honeywell electronic timers are unaffected by friction, dust or corrosion; assure constant efficient operation.

PROTECTORELAY*


SERVICE NOTE
1. SELECT PROPER VOLTAGE ON PANEL AT REAR OF CHASSIS
2. TO REMOVE CHASSIS FROM PANEL FIRST OPEN MAIN SWITCH, THEN LOOSEN LARGE SLOTTED SCREW NEAR HANDLE AND PULL OUT ON HANDLE.
3. FIRST OPEN MAIN SWITCH WHEN REMOVING THIS COVER FROM CHASSIS WHEN CHASSIS IS MOUNTED ON PANEL.
4. ORDER SELECTED AND PRETESTED TUBES YEARLY FROM M-H BY PART NUMBER.
PART NO.
TYPE
A.C. LOAD RATINGS
IGNITION TRANSFORMER
300 VA 120-240V
GAS PILOT VALVE
70 VA 120-240V
MAIN FUEL VALVE
120 VA 120-240V
ALARM CONTACT
120 VA 120-240V
MODULATING CONTROL
50 VA 120-240V
BURNER MOTOR
FULL LOAD
LOCKED ROTOR
120V 5.2A 31.2A
208V 3.7A 22.2A
240V 3.7A 22.2A
PROTECTORELAY POWER
52 WATTS MAX.
WIRING N.E.C. CL. 1 ONLY
FM
UL
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MINNEAPOLIS, MINN.
MADE IN U.S.A
95-120
VOLTMETER
102988

New Honeywell Protectorelay, R4074B is easy to install. It's available with either surface or flush-mounted cabinet or panel. Pre-installed terminals permit quick disconnect mounting. Just set flame safeguard chassis in and tighten it down.

MINNEAPOLIS
Honeywell

H HONEYWELL First in Controls

Honeywell manufactures a complete line of heating controls for all types of oil and gas burners. For information on the R4074B or on any of our other controls, call your local Honeywell office. Or, write Honeywell, Dept. HA-11-254, Minneapolis 8, Minn.

ANOTHER MAYTAG
MAYTAG Automatic Washer

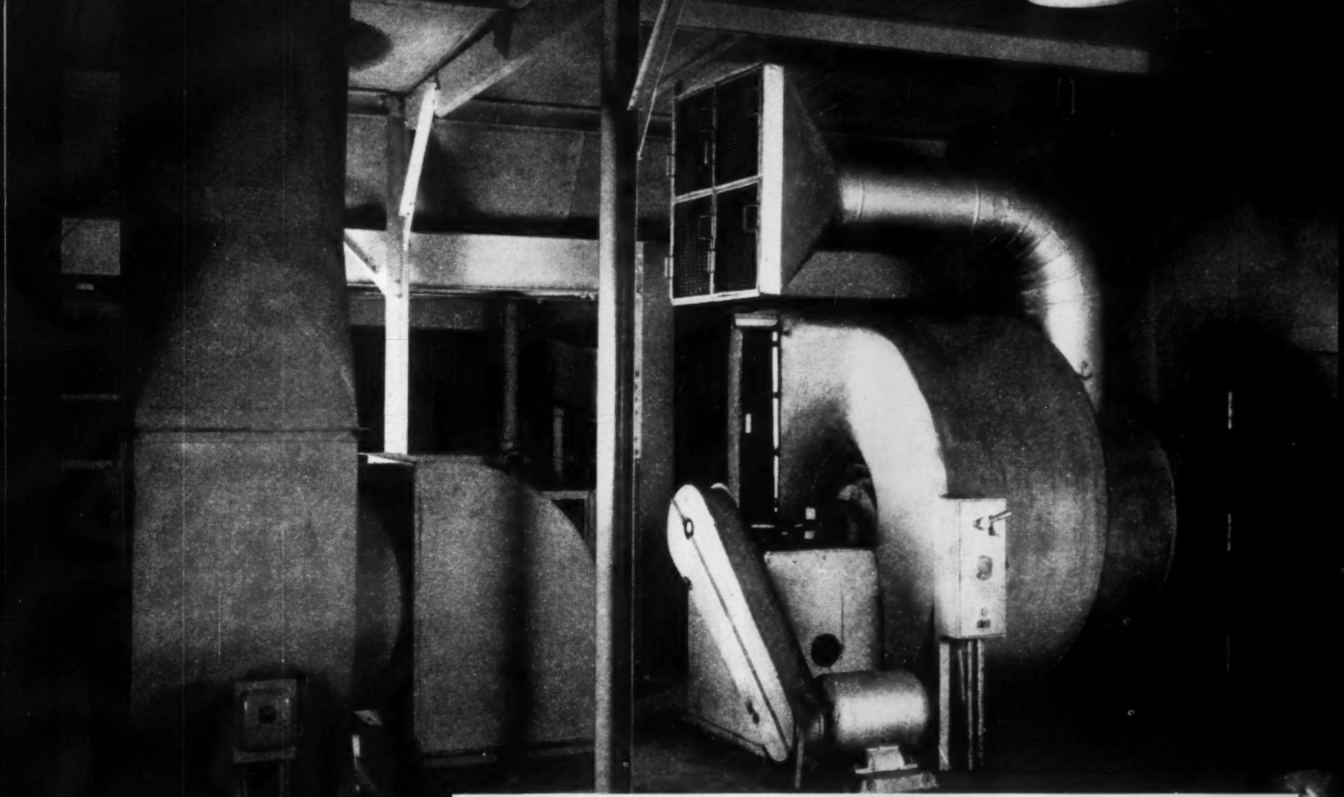
HERE, FOUR HERMAN NELSON HEATING AND VENTILATING UNITS assure ample space heat in the large warehouse at the Newton, Iowa, plant . . . one of several such "cluster" arrangements. Suspended from the ceiling, the units hang out of the way, save valuable space, provide quiet operation. Herman Nelson units of this type are available in heat capacities to one million BTU's.

Easy-to-service **HERMAN NELSON** equipment solves many heating, exhausting and ventilating problems at **MAYTAG'S** Iowa plants

Architects & Engineers—Brooks-Borg, Des Moines; Mech. Contractor—M. A. Wolin Plumbing & Heating, Des Moines; Gen. Contractor—Weitz Co., Des Moines. Fans engineered and installed by R. C. Mahon Co., Detroit.

TWO OTHER HERMAN NELSON HEATING AND VENTILATING UNITS provide abundant space heat for a service repair area. Here, units are located out of the way on a balcony. They can be installed on wall, ceiling or floor—with or without ducts. Fan sections are completely rotatable.

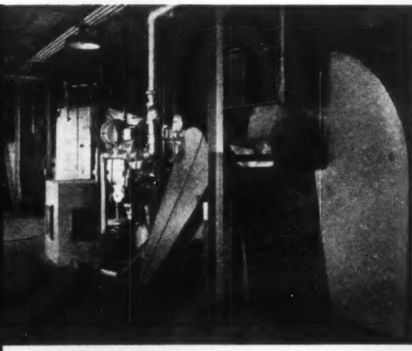
A BATTERY OF HERMAN NELSON VERTICAL UNIT HEATERS discharge warm air vertically downward or at an angle in various directions. Warehouse is heated comfortably, without drafts. Note location of the heaters high on the ceiling, out of the way. Insert shows Unit Heater detail.



A PAIR OF HERMAN NELSON CENTRIFUGAL FANS provide efficient exhausting at the Maytag plant. Unit at left serves for general exhausting. Unit at right removes super-heated air from a huge porcelaining oven. This air is so hot that asbestos covering was necessary on the fan—yet the machine has operated at top efficiency for the past nine years. Note four AAF *permanent-type*, washable filters at top of equipment.

Recently, Maytag's 10-millionth washer rolled off the production lines, as this independent home laundry appliance manufacturer set a production record unequaled in the industry. To reach this kind of record, Maytag plants must operate smoothly, efficiently. Dependable heating and ventilating is mighty important to help maintain these production schedules. Men *and* machines must operate efficiently, too.

Selection of Herman Nelson equipment for Maytag's automatic washer and dryer plant at Newton, Iowa, is another example of the confidence large manufacturers have in Herman Nelson. Years of trouble-free service are assured. If yours is a problem requiring better air, you can *depend upon* the quality, performance and efficiency of this *complete* line of air handling equipment. Tell us your needs. Our nation-wide sales and service organization is ready to help.



HERMAN NELSON CENTRIFUGAL FANS here handle other exhausting problems in the plant. These fans are available in either slow-speed or non-overloading types; 17 wheel diameters from 12¼" to 73"; 8 arrangements for direct or belt drive.

*"Better
Air
Is
Our
Business!"*

AAF

herman nelson

American Air Filter
Company, Inc.
215 Central Avenue • Louisville 8, Ky.

8 reasons why
Now! Fibrocel made even better through Johns-Manville Insulation Research
JOHNS-MANVILLE
JM
PRODUCTS
Apply Fibrocel to all hot and cold water pipes, dual service and steam lines from 35F to 300F in buildings like these:
Schools and Colleges

FIBROCEL® PIPE INSULATION

is the new standard for all commercial service

J-M Fibrocel has been the outstanding insulation in the low pressure field ever since its introduction three years ago. Now thanks to new findings by Johns-Manville's insulation research, it is even better in many ways. Today you get all these advantages in Fibrocel insulation:

Cleaner, sharper edges . . . Tight, snug-fitting edges provide better heat control, smoother appearance.

Smoother, harder surface . . . Normal abrasion and abuse in service cannot damage surface.

Firmer, stronger structure . . . Fibrocel resists compression and abuse. Gives back-up protection against puncture of jacket or vapor seal.

Heavier, smoother canvas . . . New canvas covering provides maximum protection and appearance.

plus these features always associated with Fibrocel:

No shrinkage . . . Joints stay tight . . . no unsightly gaps or costly repairs.

Easy to install . . . Fibrocel is light and easy to handle, is readily cut with a knife.

High thermal effectiveness . . . Tiny particles of silica are exploded and expanded to form a cellular structure of heat-trapping dead air spaces.

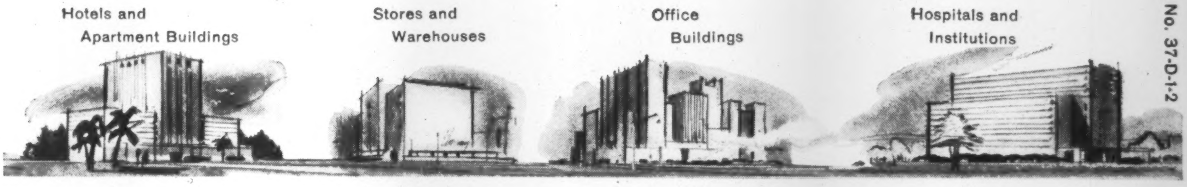
Permanent . . . Fibrocel is impervious to flame, rot, odor and vermin attack.

Write for free illustrated 8-page folder, IN-155A. It includes physical properties, insulating characteristics, sizes and thicknesses available. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JOHNS-MANVILLE INSULATIONS

FOR LASTING THERMAL EFFICIENCY

A.I.A. File No. 37-D-1-2



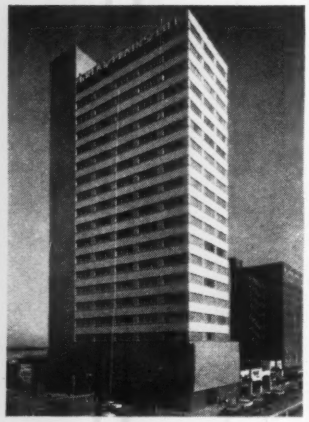
You'll find American Blower Air

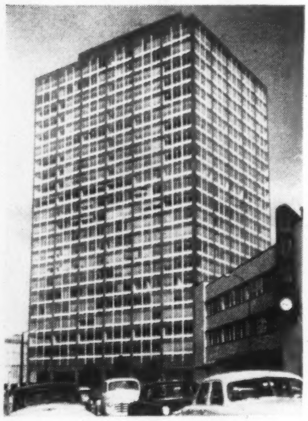
...because American Blower offers a complete line of air-conditioning products designed, engineered, and manufactured to work TOGETHER

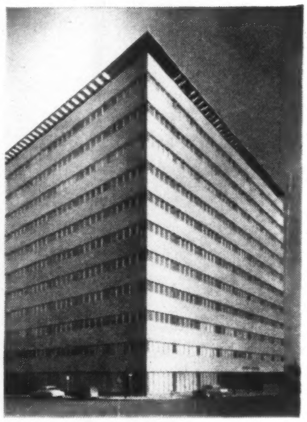
Beck Building,
Shreveport, La.

PORT AUTHORITY BUS
Port Authority Bus Terminal,
New York, N. Y.

Sheraton Hotel,
Philadelphia, Pa.


Great Plains Life Insurance
Building, Lubbock, Tex.


Mile High Center,
Denver, Colo.


Sunray Building,
Tulsa, Okla.

Conditioning wherever you go

Mondawmin Shopping Center,
Baltimore, Md.

THE EVENING AND SUNDAY
BULLETIN

Evening and Sunday Bulletin Building,
Philadelphia, Pa.

Standard Brands Building,
New York, N. Y.

Federal Office Building,
New Orleans, La.

WHETHER it's a large-scale central or zone system—or a system for a smaller store, showroom, or industrial plant – American Blower has the right air-conditioning and refrigerating equipment for your business. Buying from a single source gives you a balanced system, pinpoints responsibility for quality and performance, saves you time and money. So, if air conditioning is in *your* plans, get in touch with our nearest branch for product information. Or write: American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of **American-Standard**

American-Standard Products

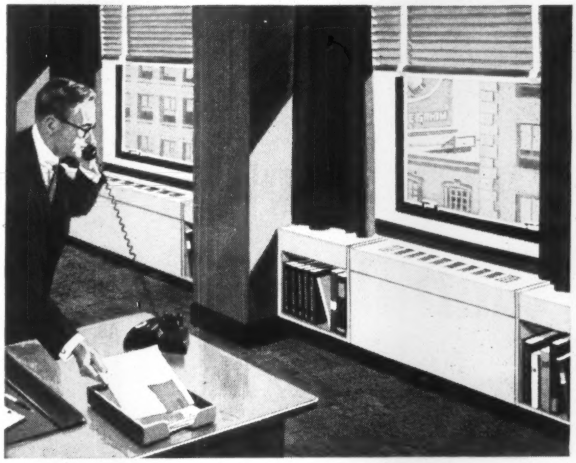
QUALITY PROTECTS YOUR INVESTMENT... **American-Standard** QUALITY IS AVAILABLE AT NO EXTRA COST

Which is the best way to air condition a building?

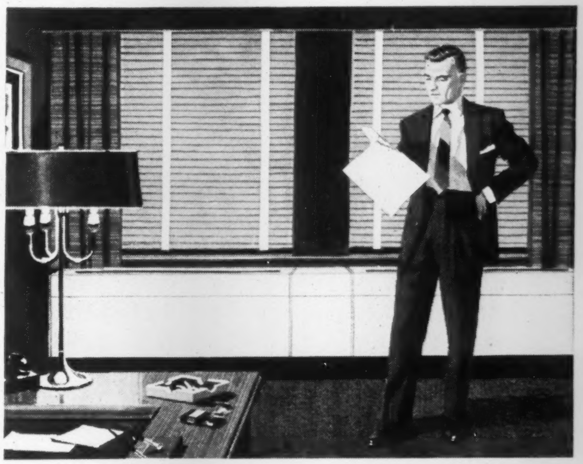
That depends on the building. Its size, age and shape are important. Its construction details, such as windows, walls and columns, affect the location of individual units. Carrier has all the answers—here's the newest! Modular Weathermaster* units. Based on the "building block" principle, they adapt to windows and wall construction in both new and old buildings, provide individual climate control in each room. Only Carrier makes Modular units like these to fit any building problem. Here are six of many combinations—note how flexible they are. For complete information, call your nearest Carrier office. Or write Carrier Corporation, Syracuse, New York.

Carrier

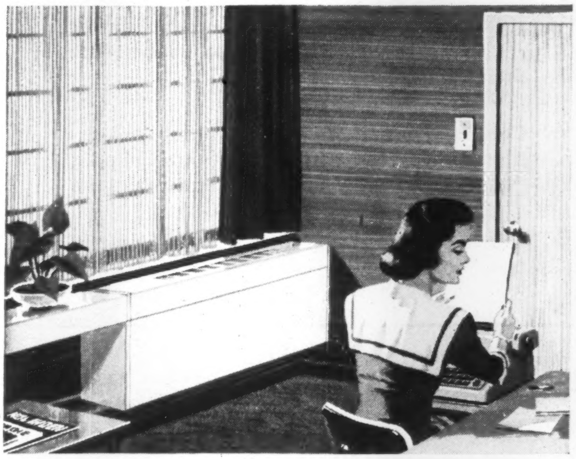
*Reg. U.S. Pat. Off.



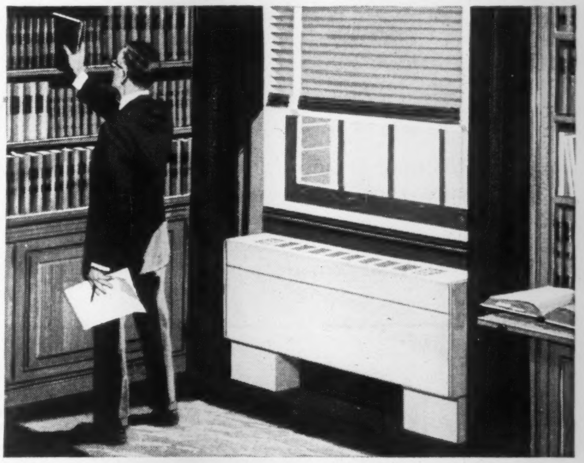
For column-to-column treatment, trim wall-hung units with standard prefabricated enclosures, accessories and shelving are "tailored" to fit building modules.



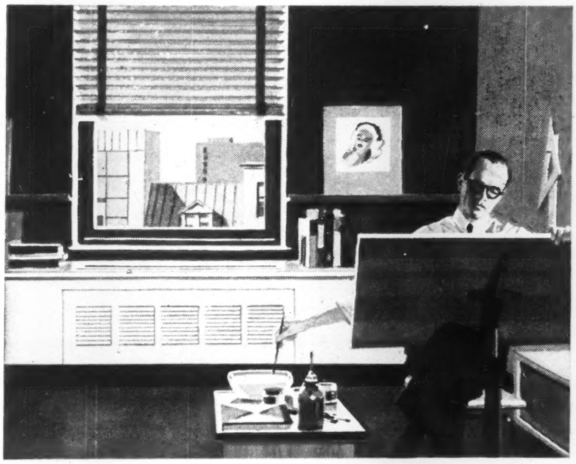
For a clean, continuous appearance, two well-proportioned Weathermaster base units separated by a filler piece look good, make future partitioning easy.



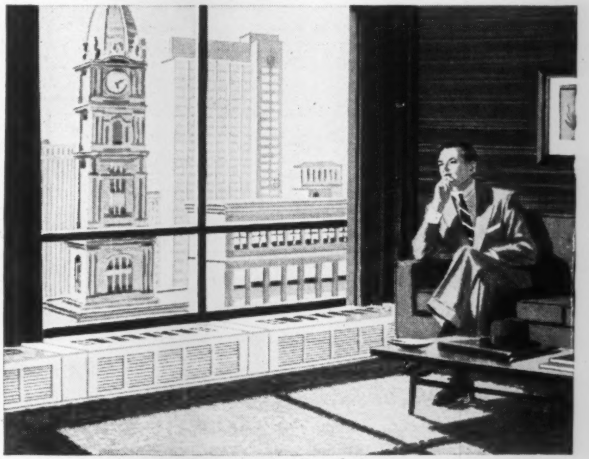
For pleasing corner assemblies, a wall-hung Modular Weathermaster unit with prefabricated cabinet and run-out enclosure is both attractive and economical.



For floor-fed services, a pedestal arrangement attractively conceals air and water risers. This method of distribution eliminates the need for furred-in risers.



For harmony with custom interiors, a decorative furred-in arrangement with base unit, inlet panel and discharge grille matches any interior treatment.



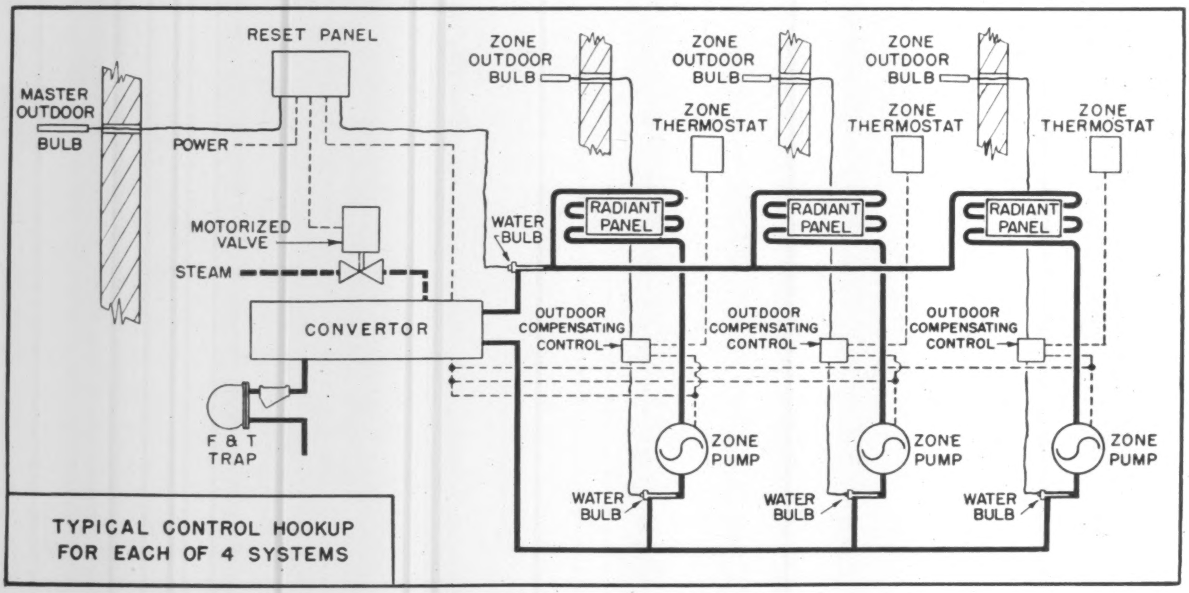
For modern, all-glass buildings, a "foot-high" column-to-column arrangement is extremely flexible and blends well with modern architecture and furnishings.

Simple, economical solution of complex heating control problem

...FOR NEW 1000-BED HOSPITAL

Highlights of this SARCOTHERM CONTROL SYSTEM

1. Provides *automatically controlled* heating comfort for 13 separate radiant heating zones.
2. Maintains uniform inside temperature in each zone by *automatically adjusting* flow of hot water through system to compensate for changes in outdoor temperature and room load demand.
3. *Automatically controls* flow of steam to each of 4 heat exchangers, varying temperature of hot water supplied to each radiant heating system in response to outdoor temperature changes.
4. *Combines simplicity* with accuracy and dependability . . . instruments are simple, rugged . . . easy to adjust and maintain.
5. *Insures low installed cost* . . . because of fewer controls, less wiring.

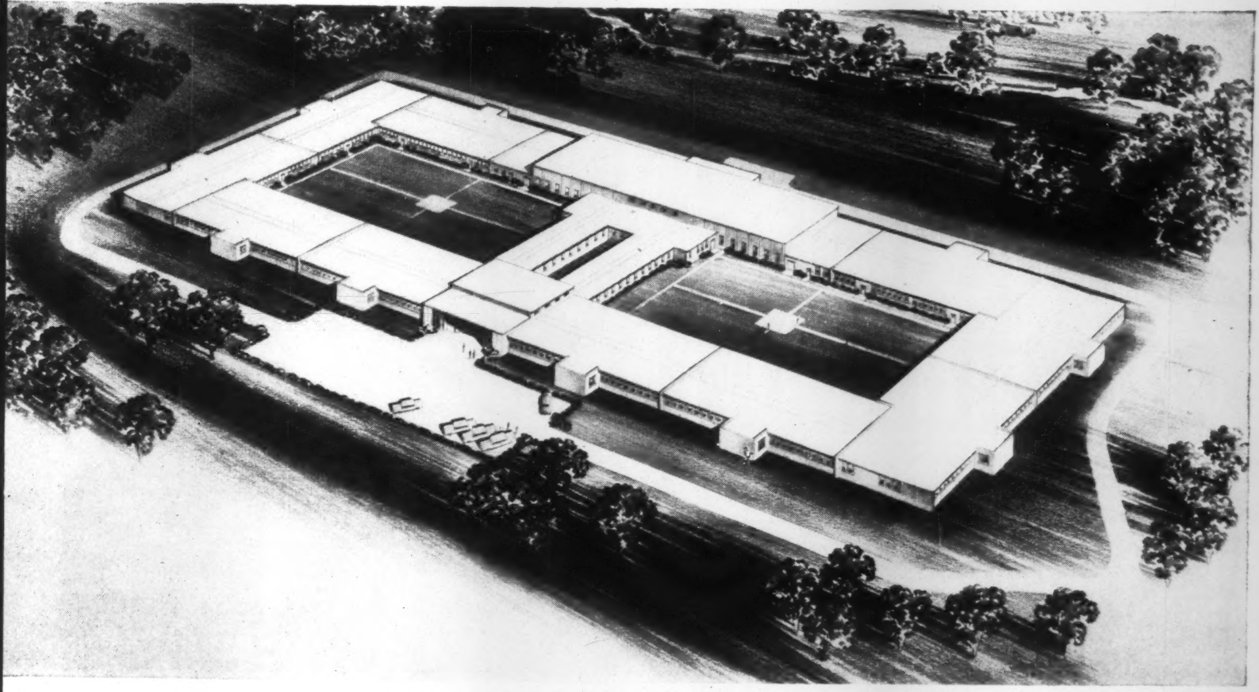

RESET PANEL
MASTER OUTDOOR BULB
POWER
MOTORIZED VALVE
STEAM
CONVERTOR
F & T TRAP
WATER BULB
ZONE OUTDOOR BULB
ZONE OUTDOOR BULB
ZONE OUTDOOR BULB
ZONE THERMOSTAT
ZONE THERMOSTAT
ZONE THERMOSTAT
RADIANT PANEL
RADIANT PANEL
RADIANT PANEL
OUTDOOR COMPENSATING CONTROL
OUTDOOR COMPENSATING CONTROL
OUTDOOR COMPENSATING CONTROL
ZONE PUMP
ZONE PUMP
ZONE PUMP
WATER BULB
WATER BULB
WATER BULB

TYPICAL CONTROL HOOKUP FOR EACH OF 4 SYSTEMS

UNDIVIDED RESPONSIBILITY

Complete weather-compensated control system plus heating specialties from one dependable source. **In addition to Sarcotherm control system components illustrated above, Sarcotherm and Sarco products installed include Sarcofin radiation, thermostats, balancing fittings with access boxes, radiator valves, thermostatic steam traps, Thermo-Dynamic steam traps and other accessories.**

WEATHER-COMPENSATED CONTROL SYSTEMS FOR



Milledgeville State Hospital, Milledgeville, Georgia
1000-bed Psychiatric Building No. 2

Equipped with Sarcotherm Weather-Compensated Control System for radiant heating. **Architects** — Gregson & Associates, Atlanta, Ga. **Mechanical Engineers** — Ammons, McClure & Caldwell, Atlanta, Ga. **General Contractor** — Jordan Contracting Company, Columbus, Ga. **Mechanical Contractor** — Spivey Plumbing & Heating Co., Dublin, Ga.

OTHER ADVANTAGES OF SARCOTHERM SYSTEMS

Application engineering — Sarcotherm engineers, backed by years of experience in heating control systems, assist consulting engineers with individualized system diagrams.

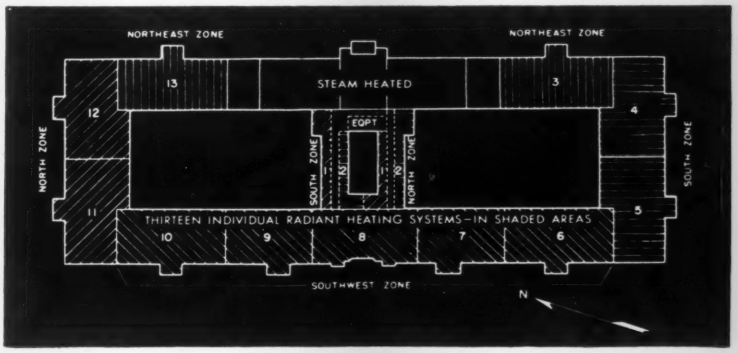
Easy to install — special installation drawings and diagrams of the complete system are furnished for each job.

Easy to maintain and adjust — by regular maintenance men, because of construction simplicity, fewer parts.

On-the-job assistance — to contractors from Sarcotherm's field engineers.

* * *

FOR COMPLETE CONTROL SYSTEM CATALOG, write . . . Sarcotherm Controls, Inc., 635 Madison Avenue, New York 22, N.Y.


NORTHEAST ZONE
NORTHEAST ZONE
13
STEAM HEATED
3
12
4
NORTH ZONE
EQPT
SOUTH ZONE
1
2
1
2
NORTH ZONE
SOUTH ZONE
11
5
THIRTEEN INDIVIDUAL RADIANT HEATING SYSTEMS—IN SHADED AREAS
10
9
8
7
6
SOUTHWEST ZONE
N

Details of heating system

Building supplied with medium pressure steam from boiler house about 3000 feet away.

Steam supplies direct heat to unit heaters (black area) and indirect heat, through four heat exchangers, to 13 individual floor type radiant heating systems (shaded areas), each of which has its own pump.

Radiant heating systems consist of serpentine coils of ¾ inch wrought iron pipe imbedded in the concrete floor.

Sarcotherm

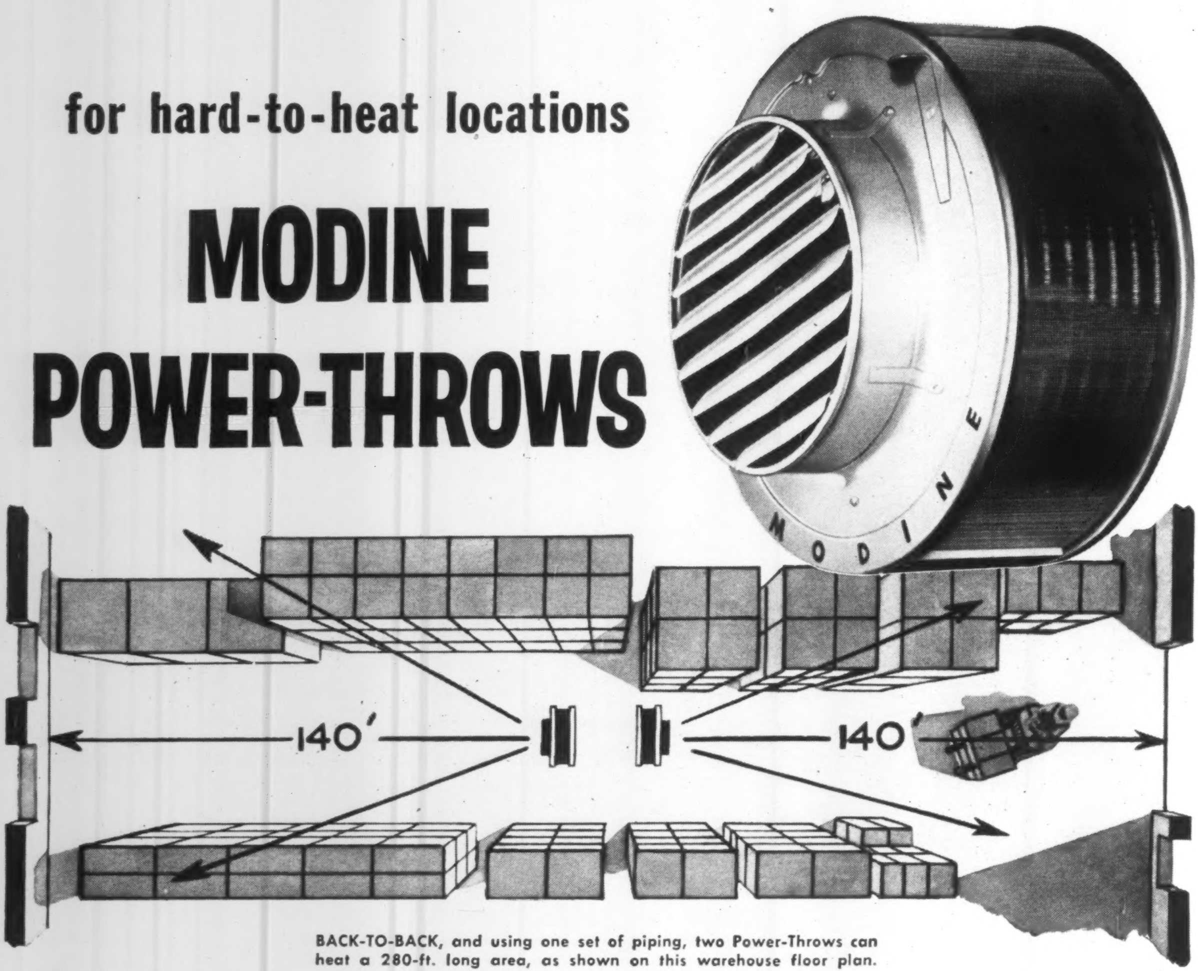
AN AFFILIATE OF SARCO CO., INC.

4011-B

STEAM, HOT WATER AND RADIANT HEATING

for hard-to-heat locations

MODINE POWER-THROWS



BACK-TO-BACK, and using one set of piping, two Power-Throws can heat a 280-ft. long area, as shown on this warehouse floor plan.

. . . twice the range of conventional unit heaters

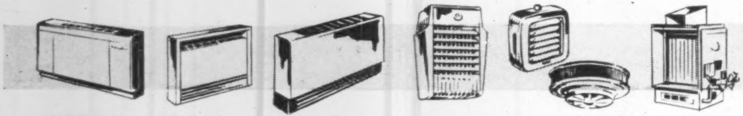
If you have a difficult heating problem, the Modine Power-Throw unit heater may be your answer. It is designed to provide a powerful horizontal discharge of heated air at higher than normal velocities. Its exceptionally long heat-throw—up to 140 feet—permits heat distribution over a wide area.

Power-Throws are used in large plants and warehouses—often to blanket frequently opened doors with a curtain of warm air. Their high capacities—271,200 to 609,600 Btu—permit them to replace a number of standard units with resulting economies in equipment and installation costs.

High-corrosion-resistant models. For those plants faced with severe internal corrosion problems requiring the frequent replacement of heating equipment—Modine offers the Power-Throw in HCR (High Corrosion Resistant) models.

Ask the Modine representative listed in the Yellow Pages for Catalog 157 that also covers the broad range of standard Modine horizontal and vertical delivery unit heaters. Or write Modine Mfg. Co., 1509 DeKoven Ave., Racine, Wisconsin.

SU-1348



AIRditioners **Convectors** **Cabinet units** **Gas unit heaters** **Steam & hot water unit heaters** **Duct furnaces**

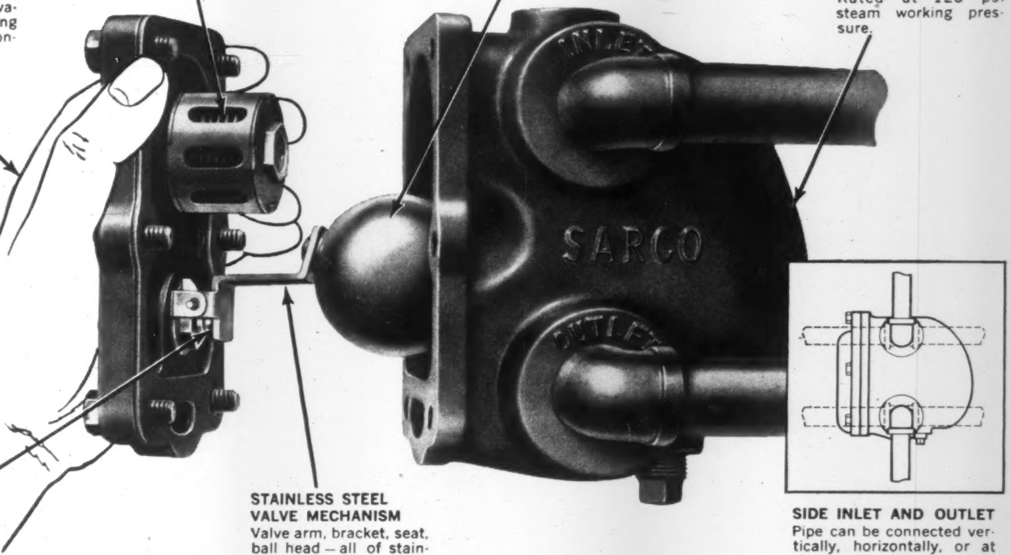
In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

Now...more trapping value for your money!

NEW SARCO FLOAT-THERMOSTATIC STEAM TRAP

with improved engineering features



EASY ACCESS TO ALL WORKING PARTS
Entire trap mechanism is attached to easily removable cover. No disturbing of inlet and outlet connections.

THERMOSTATIC BELLOWS FOR AIR BY-PASS
To insure long life – made of special copper alloy, drawn and corrugated by exclusive process in Sarco's plant.

HEAVY-WALL COPPER FLOAT
Reinforced at lever connection. Copper-plated for greater durability.

SEMI-STEEL BODY AND COVER
Rated at 125 psi steam working pressure.

VALVE HEAD STAINLESS STEEL BALL BEARING
Its accuracy and hardness insure tight shut-off, long life.

STAINLESS STEEL VALVE MECHANISM
Valve arm, bracket, seat, ball head – all of stainless steel. Seat is hardened.

SIDE INLET AND OUTLET
Pipe can be connected vertically, horizontally, or at right angles.

This new, improved Sarco Float-Thermostatic Steam Trap Type FT discharges condensate at steam temperature continuously and without shock.

Recommended to drip steam mains, unit heaters, blast coils, heat exchangers, and other allied process equipment, requiring accurate temperature control.

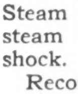
Air Binding Impossible – equipped with separate thermostatic air vent, which removes automatically and immediately all air and incondensable gases reaching trap. Balanced pressure vent self-adjusts to all operating pressures. Its location above condensate level permits discharge of air and gases reaching trap after start-up. Does not require adjustment when pressures change.

Sizes – ¾ and 1″
For steam pressures – 0 to 125 psi

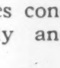
Write for Bulletin 455-B **to Sarco Company Inc.,**
635 Madison Avenue, New York 22, N.Y.

2210B

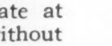
SARCO



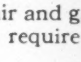
REMEMBER— only Sarco makes all types



Thermostatic Steam Traps

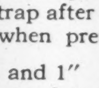


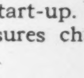
Liquid Expansion Steam Traps



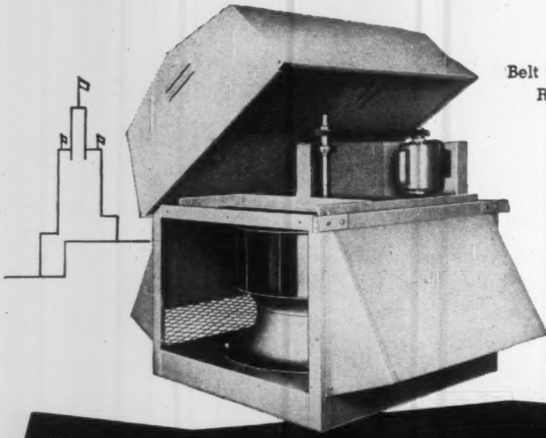
Thermo-Dynamic Steam Traps

Float Thermostatic Steam Traps





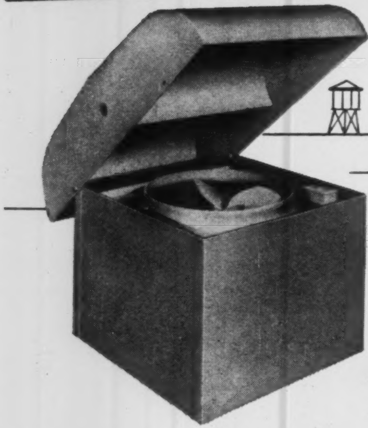
Camlift Bucket Steam Traps



Belt Drive Centrifugal
Roof Ventilator

Recommended for their high quality, ease of installation, low maintenance cost, trouble-free operation, space-saving features, and blower-like performance.

Peerless Electric Roof Ventilators . . .

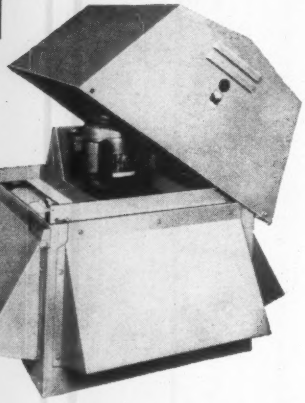


Propeller-Type Power
Roof Ventilator

Certified Ratings
CR
PFMA

Peerless Electric Roof Ventilators offer engineers, architects, contractors and users PFMA rated units that embody sturdiness, high performance ratings, and low noise levels. They are particularly suited for public buildings, industrial plants, hospitals, churches, schools, and other similar applications.

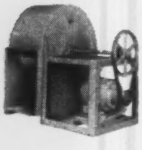
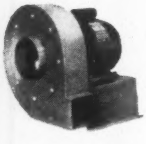
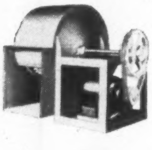
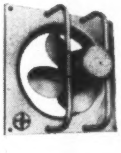
Sizes range from 12″ to 60″ wheels; 640 to 45,000 c.f.m., depending upon the unit selected. Peerless Electric Roof Ventilators are built of 16 gage steel, or heavier, to last the life of the building. They fit all standard curb sizes. Matching wheel cones accurately fit venturi inlet for quieter operation . . . smoother air movement.



Direct Drive Centrifugal
Roof Ventilator

Write Today for Bulletins SDA-220, SDA-160 and SDA-200.

A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless® Electric

FAN AND BLOWER DIVISION
THE Peerless Electric® COMPANY
1409 W. MARKET ST. • WARREN, OHIO
FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

SEE OUR CATALOG IN SWEET'S

*Why 18 miles of SNAP*ON was used in huge Conrad Hilton air conditioning installation…*

More than 18 miles of Snap*On glass fiber pipe insulation was installed in the new air conditioning system of the Conrad Hilton Hotel in Chicago, the world's largest hotel. Snap*On, in one-piece sections, with vapor barrier jackets adhered was selected because it is the fastest and most economical way to insulate piping, particularly large pipes like the Conrad Hilton's dual-temperature water lines . . . and because —

- **Snap*On is fire resistant.**
- **Snap*On has the highest thermal efficiency of any pipe insulation in its temperature range.**
- **Snap*On is uniform in wall thickness.**
- **Snap*On has fewer joints that can lead to heat loss, heat gain, or vapor condensation.**

Available in a wide range of lengths, wall thicknesses, and jackets, there is a Snap*On pipe insulation for your next job.

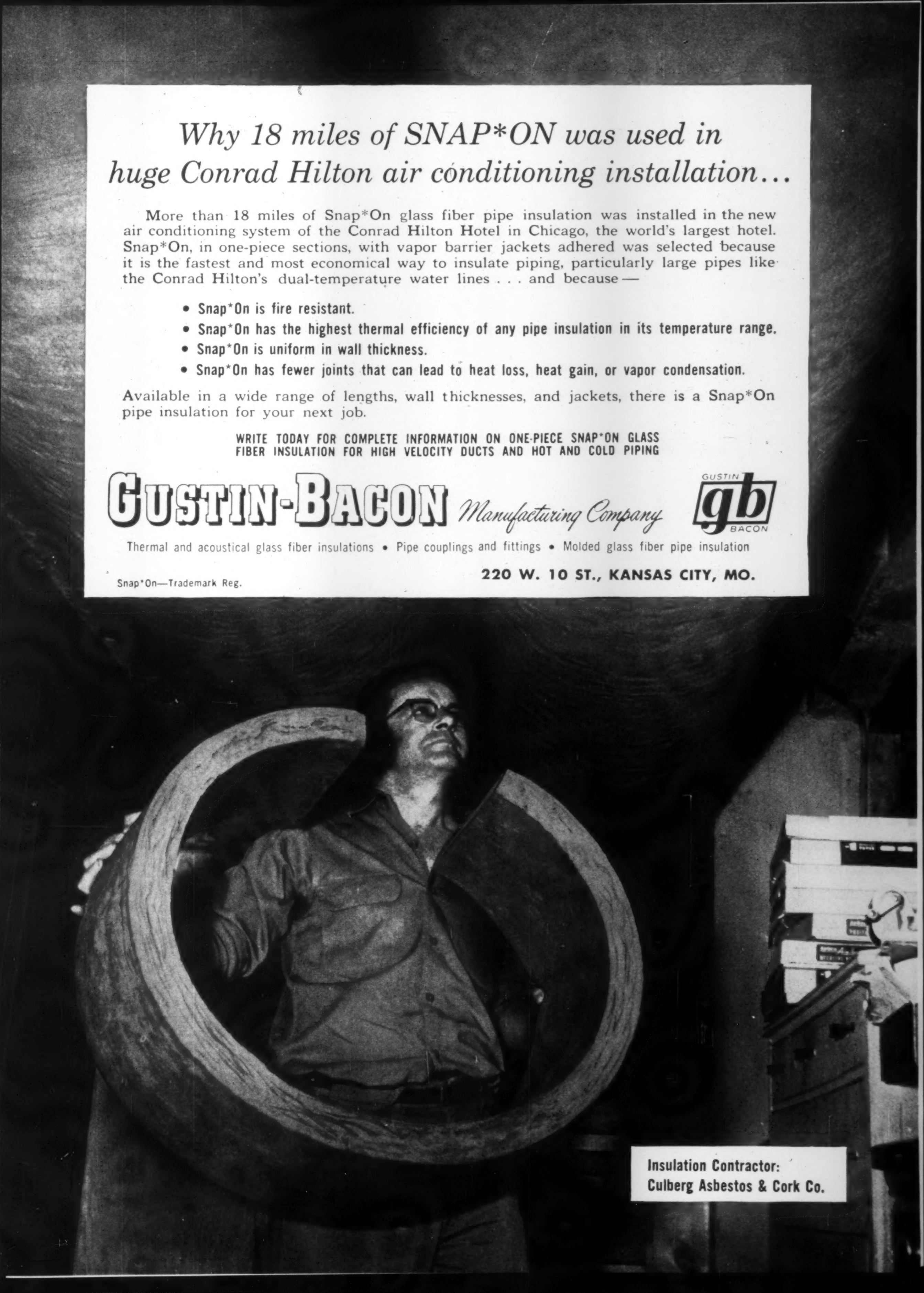
WRITE TODAY FOR COMPLETE INFORMATION ON ONE-PIECE SNAP*ON GLASS FIBER INSULATION FOR HIGH VELOCITY DUCTS AND HOT AND COLD PIPING

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

Snap*On—Trademark Reg.

220 W. 10 ST., KANSAS CITY, MO.



Insulation Contractor:
Culberg Asbestos & Cork Co.

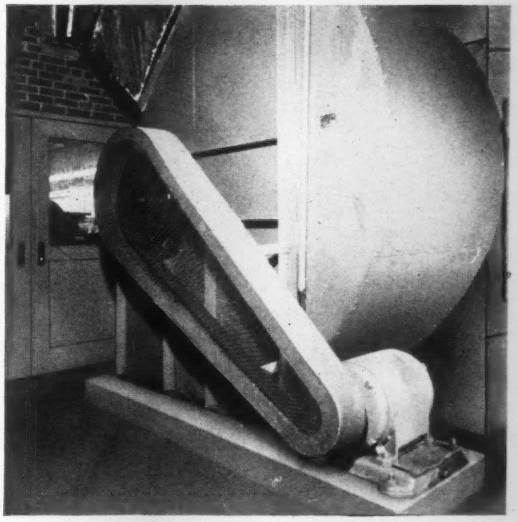
It's cool comfort at this textile

GUILFORD TEXTILE MILLS, GREENSBORO,

Modern Textile Mills, such as shown above, require accurate control of air temperature, humidity, cleanliness and distribution. Air Conditioning Corporation and The Massachusetts Blower Division of The Bishop & Babcock Mfg. Co. have combined to meet these requirements.

MASSACHUSETTS BLOWER DIVISION
The BISHOP & BABCOCK Mfg. Co.
4901 HAMILTON AVENUE · CLEVELAND 14, OHIO

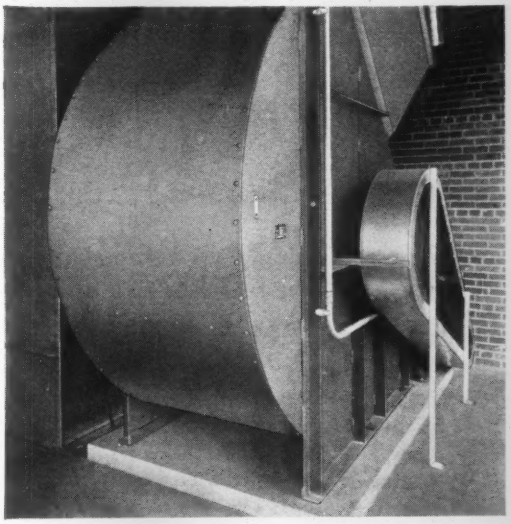
The **MASSACHUSETTS** *Line*



Conventional air moving equipment (Massachusetts) operated 24 hours daily, six days per week, since 1948.

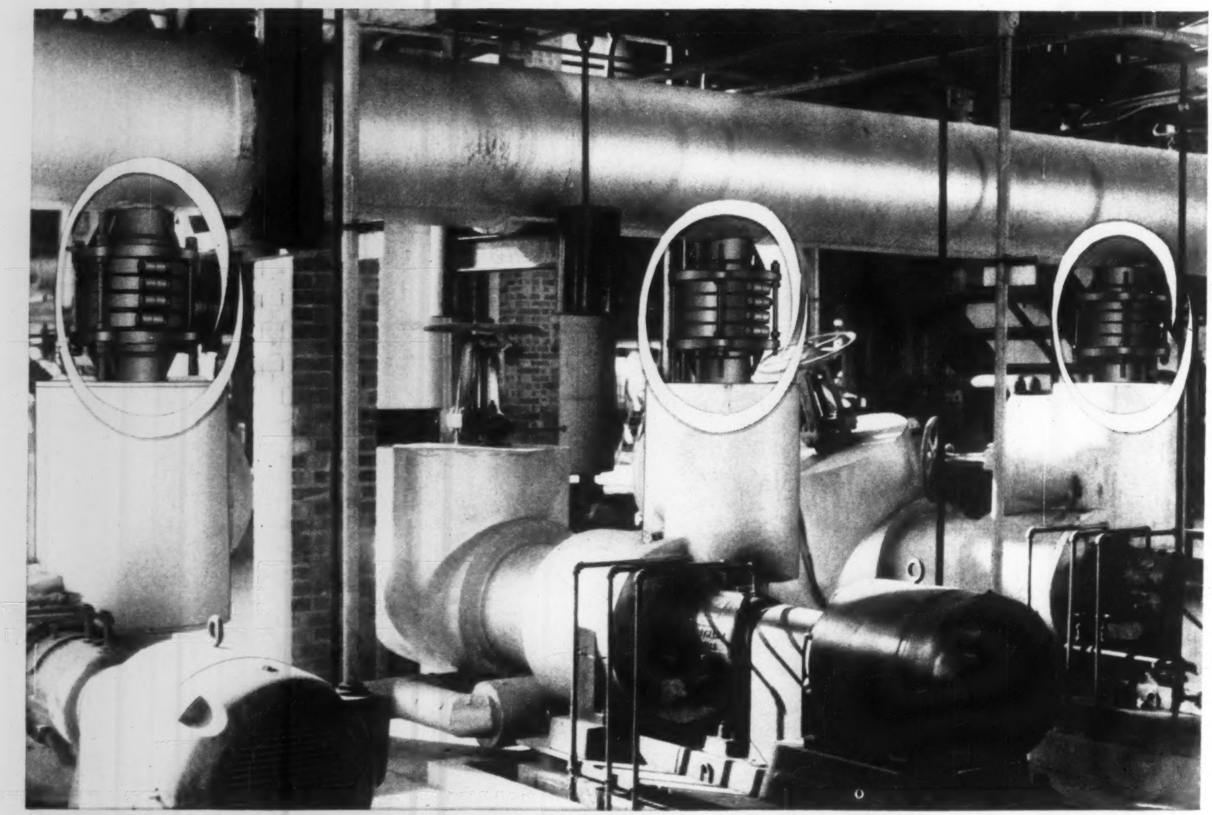
mill with MASSACHUSETTS!

NORTH CAROLINA



Recently installed Massachusetts Fan distributing conditioned air.
Contractor: Air Conditioning Corporation, Greensboro, North Carolina.

The distribution of conditioned air by Massachusetts Fan, plays an important part in the processing of fabrics in this weaving department.



ADSCO CORRUFLEX EXPANSION JOINTS SOLVED A PIPING PROBLEM FOR NATIONAL ANILINE

The new $20,000,000 diisocyanates plant of the National Aniline Division, Allied Chemical & Dye Corp., at Moundsville, W.Va., is known for many engineering wonders, especially its miles of intricate piping. The photo above shows three ADSCO Corruflex anti-compression packless expansion joints used to secure satisfactory piping connections between the main piping and three pumps.

If rigid piping had been used to connect the three pumps to the 18-inch main feeder, the piping soon would have been twisted and overstressed by the growth of the main feeder when hot process liquid was pumped through it. National Aniline engineers, in consultation with ADSCO engineers, decided to use the anti-compression joints shown in the photo. These are deflected laterally with minimum strain on the connecting piping and pumps as the main feeder expands or contracts. Also, the joints absorb vibration of the pumps and motors.

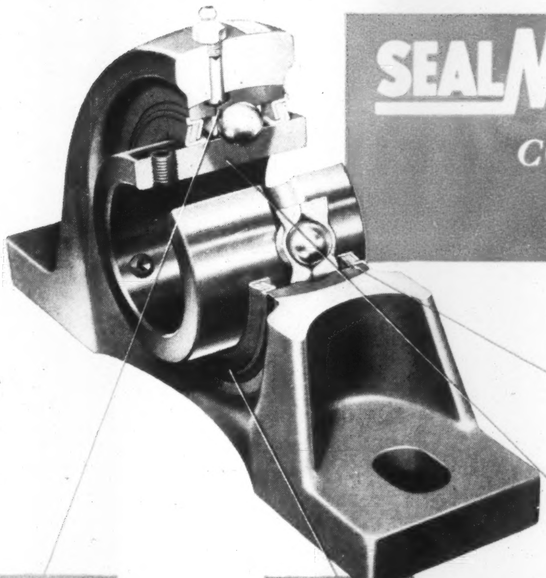
For efficient, right-working pipe line arrangements, use ADSCO Corruflex expansion joints. Packless, they require no maintenance. Sizes, 3" to 54"; for temperatures to 1600 F and pressures to 300 psi.

REMEMBER! Use ADSCO Expansion Joints instead of Pipe Bends because of these advantages:

1. Less Heat Loss **2. Less Pressure Drop** **3. Less Space** **4. Less Cost**

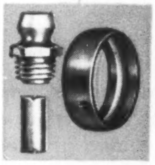
ADSCO
DIVISION
20 MILBURN STREET
BUFFALO 12, NEW YORK

YUBA
CONSOLIDATED INDUSTRIES, INC.



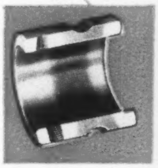
SEALMASTER'S EXCLUSIVE COMBINATION OF FEATURES ARE SETTING THE PACE!

When you design, you design your products for maximum performance—and **Sealmaster** helps you attain it. **Sealmaster** Ball Bearing Units are engineered and manufactured with the same painstaking quality control you would insist on maintaining within your own plant. **Sealmaster's** exclusive combination of features assure you of maximum performance for each bearing. You'll want full information on how important these features are to you and your own product's performance.



LOCKING PIN & PERIMETER DIMPLE—prevents rotation of outer race and assures positive lubrication.

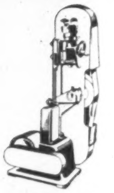
LABYRINTH-SEAL—keeps dust and dirt out and lubricant sealed in for long bearing life.



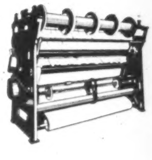
ZONE HARDENING—assures positive race to shaft holding power.

LANDRIDDEN BALL RETAINER—eliminates ball wear, traps grease and prevents churning.

...For Outstanding Bearing Performance



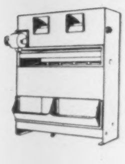
MACHINE TOOLS
SEALMASTER quality pays off where the trend is to continuous, fast, automatic equipment.



TEXTILE INDUSTRY
Clean, fast production is assured with SEALMASTER Bearings.

FARM MACHINERY
SEALMASTER Ball Bearing Units keep dust and dirt out, lubricant in—a feature Farm Machinery demands.

CONVEYORS
SEALMASTER Ball Bearing Units are featured by manufacturers of many types of conveyors.



AIR CONDITIONING
Quiet, trouble-free performance is assured with SEALMASTER. Find out about new rubber mounted units.

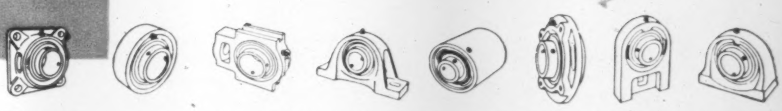
CONSTRUCTION MACHINERY
SEALMASTER Ball Bearing Units provide the features for gruelling performance in construction and materials handling equipment.

SEALMASTER ®

BALL BEARING UNITS

Write for Bulletin 454

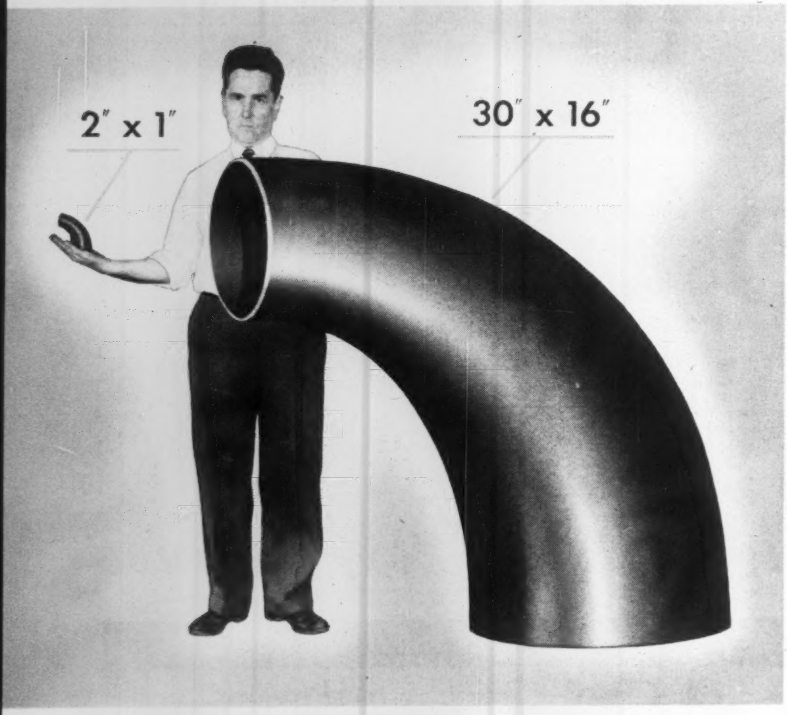
SEALMASTER
BALL BEARING UNITS
SEALMASTER BEARINGS



SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO. 47 RIDGEWAY AVENUE, AURORA, ILL

NOW . . . IN STOCK . . . NOT SPECIALS

MIDWEST REDUCING ELBOWS UP TO 30″



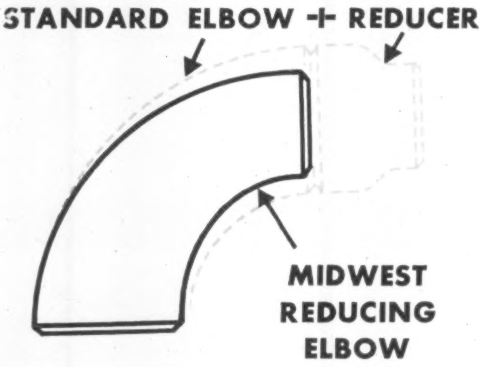
Your demand for Midwest Reducing Elbows has dictated our decision to make them STOCK items in all pipe sizes to 30″ OD and all reductions to one-half the nominal pipe size. We now have a modest stock of practically all sizes in standard and extra heavy weight, and this stock is being added to as rapidly as possible.

Midwest Reducing Elbows are also made as "specials" in heavy wall and/or any weldable alloy. The fact that our raw material is plate instead of tubing greatly increases our range of wall thicknesses and types of materials . . . it also improves the delivery.

Note the significant advantages of Midwest Reducing Elbows listed below. For further information, get in touch with the nearest Midwest Distributor or write us for Catalog 54.

CHECK THESE ADVANTAGES OF MIDWEST REDUCING ELBOWS

- **. . . . Save more than ⅓ of the welding required by standard elbows and reducers.**
- **. . . . Reduce turbulance and pressure drop because of gradual taper.**
- **. . . . Fit into smaller space than straight elbows and reducers.**
- **. . . . Greater piping design opportunities . . . easily adaptable for making special reducing fittings such as "bull-head" tees and back-outlet elbows.**
- **. . . . Improve appearance of piping.**
- **. . . . Available from stock in sizes to 30″ OD. (Heavy walls and alloys on special order.)**



MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second St., St. Louis 4, Mo.

PLANTS: ST. LOUIS, CLIFTON, N. J. and LOS ANGELES

SALES OFFICES:

ASHEVILLE—(BOX 446, SKYLAND, N.C.)
BOSTON 27—426 FIRST ST.
CHICAGO 3—79 WEST MONROE ST.
CLEVELAND 14—616 ST. CLAIR AVE.
HOUSTON 2—1213 CAPITOL AVE.
LOS ANGELES 33—520 ANDERSON ST.
MIAMI 34—2103 LE JEUNE RD.
NEW YORK 7—50 CHURCH ST
ONEIDA, N.Y.—282 NORTH MAIN ST.
PITTSBURGH 19, PA.—437 GRANT ST.
SAN FRANCISCO 11 — 420 MARKET ST.

STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

Want *your* installations to start a "Chain Reaction"?

Photo courtesy Manger Hotels, New York, N. Y.

That's what happened when this man installed PLIOTRON filters in one of the New York hotels. The new filters did such an efficient, money-saving job that the hotel owners soon ordered them for the nine other hostelries in their chain.

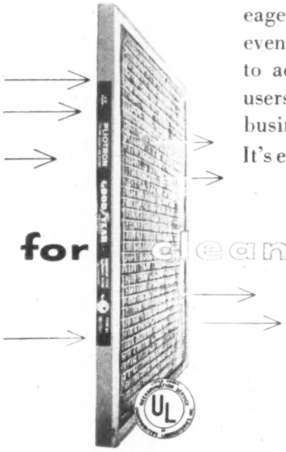
That sort of "chain reaction"—from PLIOTRON installations, large and small—is not unusual. Maintenance supervisors of multiple buildings eagerly standardize on standout items. And even one-shop and one-home owners are quick to advertise their satisfaction to fellow filter-users. In any case, you're in line for extra business.

It's easy to see why. Putting in PLIOTRON, means putting in extra-efficiency, electrostatic filters that attract and then trap as much as *5 times* the fine dirt particles as captured by ordinary types. For it's not a surface-loader—but a depth-loader. It stays on the job far longer between cleanings. Even then, a quick bath puts it back at full filter-power.

It's no mystery, then, why filter-users are willing to pay a little higher—in initial cost—for money savers like these. Or why most every PLIOTRON super-filter installation leads to more installations—and profits—for you. For the complete story, write:

Goodyear, P. O. Box 288, Akron, Ohio.

Pliotron—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

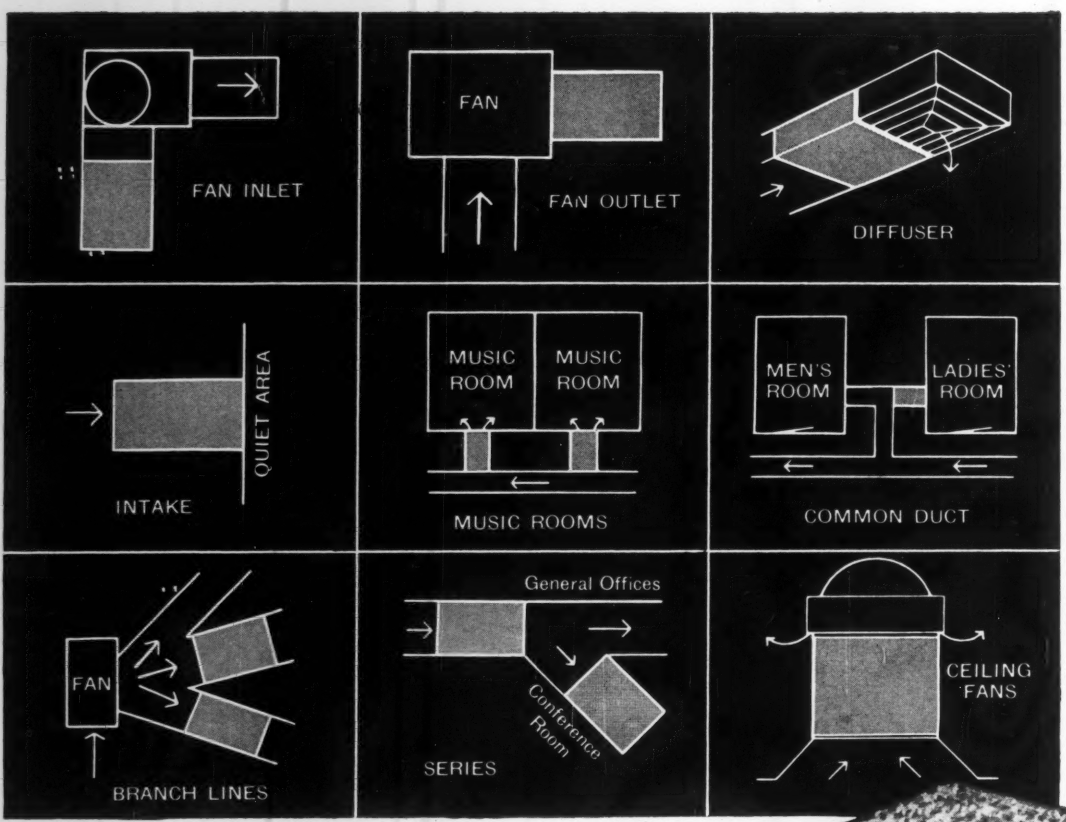


for cleaner air everywhere—

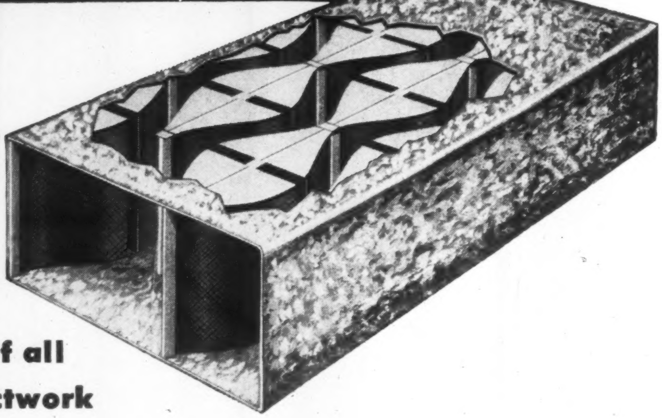
PLIOTRON AIR FILTER BY

GOODYEAR

THE GREATEST NAME IN RUBBER


FAN INLET
FAN
FAN OUTLET
DIFFUSER
INTAKE
QUIET AREA
MUSIC ROOM
MUSIC ROOM
MUSIC ROOMS
MEN'S ROOM
LADIES' ROOM
COMMON DUCT
FAN
BRANCH LINES
General Offices
Conference Room
SERIES
CEILING FANS

Every Building Needs *Aircoustat* Sound Traps



AIRCOUSTAT silences all noise of all frequencies traveling through ductwork

Eliminate disturbance, distraction and irritation caused by noises escaping from one area to another through ductwork.

Install AIRCOUSTAT Sound Traps. AIRCOUSTAT eliminates guesswork, wasted space and unnecessary expense of duct lining. You can guarantee your client trouble-free performance. You can estimate with complete confidence the performance of particular applications. If AIRCOUSTAT fits geometrically, it fits acoustically.

AIRCOUSTAT saves you space. Its greater effectiveness permits smaller-sized ducting. It eliminates bulky mufflers.

For more details, write to KOPPERS COMPANY, INC., Industrial Sound Control Dept., 6211 Scott Street, Baltimore 3, Md.

KOPPERS

INDUSTRIAL SOUND CONTROL

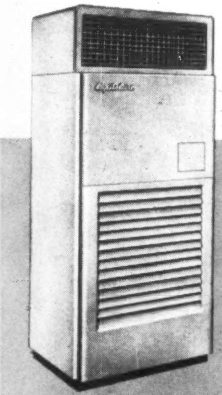
Engineered Products Sold with **Service**

Capitolaire

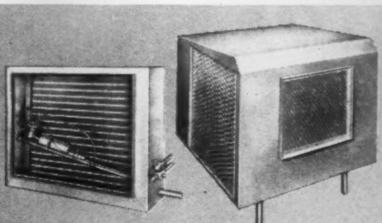
The complete line of

- Residential
- Commercial
- Industrial

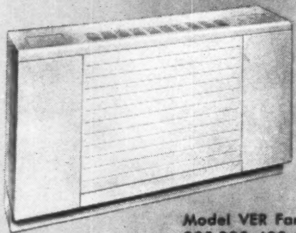
Air Conditioning Products



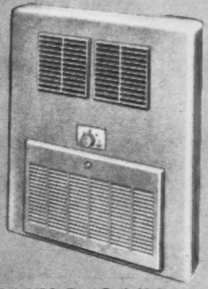
Model COM Commercial Air Conditioner 3 & 5 ton—Water & Air Cooled



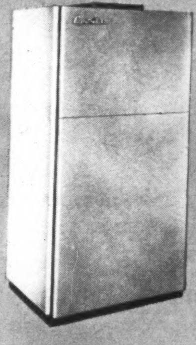
Model CF Flat Coil with Remote Air-Cooled Condensing Unit



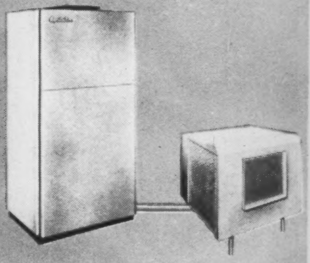
Model VER Fan-Coil Units 200,300,400, & 600 CFM



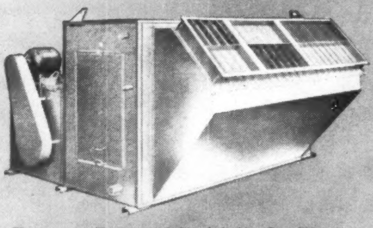
Model VRS Fan-Coil Unit Summer Cooling—Winter Heating



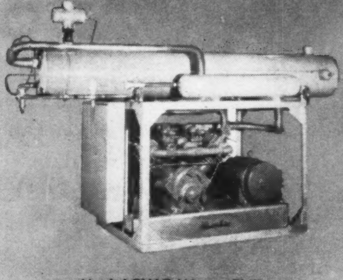
Model RES Residential Air Conditioner Air Cooled —3 & 5 ton



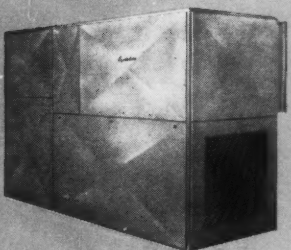
Model RES Residential Air Conditioner 3 & 5 ton Water Cooled



Flexazone Horizontal Model Air Conditioner for multi-room applications. CFM capacities from 1800 to 24,000. Vertical model available.



Model CWG Water Chiller 7½ thru 75 tons



Model AECR Air Conditioner with Built-in Evaporative Condenser 7½ thru 60 tons. Also available as water cooled.

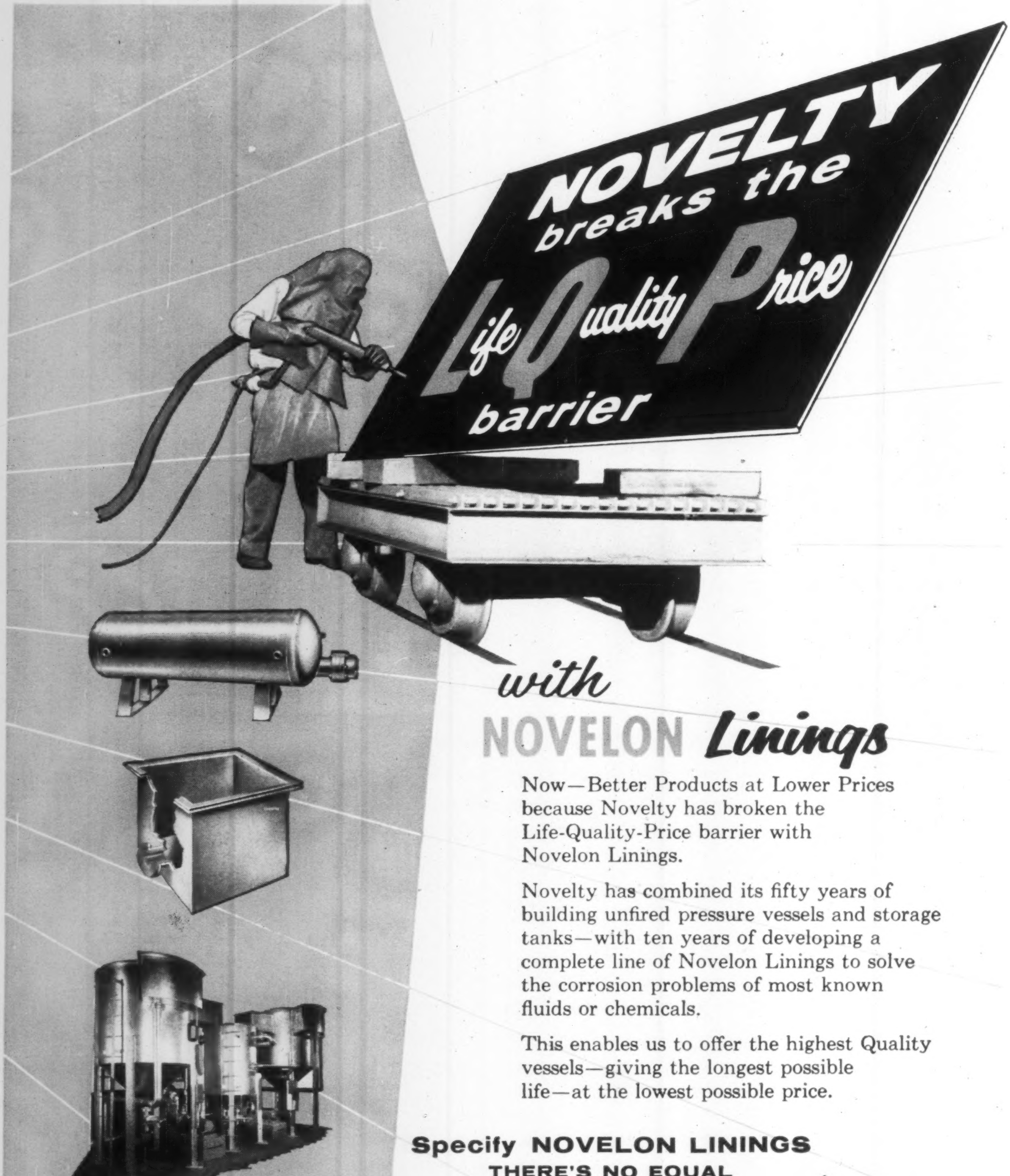
See our display in Booths 269-271, Air Conditioning Refrigeration Exposition Chicago, Nov. 18-21

Send to Marketing & Promotional Department for free bulletin on air conditioning equipment which interests you.

National-U.S. Radiator
CORPORATION

A-2

HEATING AND AIR CONDITIONING DIVISION
Johnstown, Pennsylvania


NOVELTY
breaks the
Life Quality Price
barrier

with

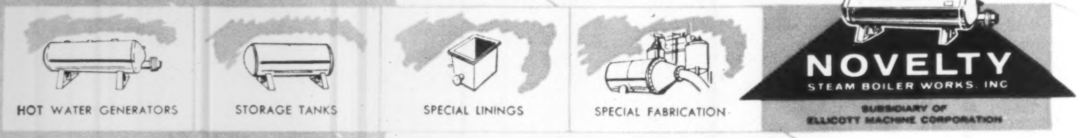
NOVELON *Linings*

Now—Better Products at Lower Prices because Novelty has broken the Life-Quality-Price barrier with Novelon Linings.

Novelty has combined its fifty years of building unfired pressure vessels and storage tanks—with ten years of developing a complete line of Novelon Linings to solve the corrosion problems of most known fluids or chemicals.

This enables us to offer the highest Quality vessels—giving the longest possible life—at the lowest possible price.

Specify NOVELON LININGS
THERE'S NO EQUAL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STEAM BOILER WORKS, INC
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NOVELTY STEAM BOILER WORKS, INC.
2029 KLOMAN ST. • PHONE PLAZA 2-0425 • BALTIMORE 30, MD.

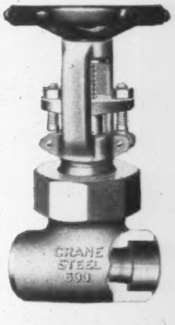
When specifications say "Welded Piping" get everything for the job from CRANE

It is far more satisfactory to get *all* your welding piping materials . . . fittings, flanges, valves, nipples, pipe… from *one* source—CRANE.

Then you're sure of uniform quality. Whether the product is a simple fitting or 24-inch high-pressure, high-temperature valves, Crane controls quality—from raw materials to the finished product.

Each welding type fitting, flange or valve you get from Crane is produced and inspected to established standards—assuring uniform size, wall thickness, and dimensional accuracy—for a good welding job.

One source of supply—from Crane—simplifies ordering, bookkeeping and stock-keeping. Prompt delivery service can be had from Crane's 141 branches, or from wholesalers who serve all areas.



CRANE
QUALITY MATERIALS FOR WELDED PIPING

Send for this new Circular of Crane Quality Materials for Welded Piping. Ask for AD-2289.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

RX *MIXED-FLOW BLOWER UNIT: A TORRINGTON 1st*

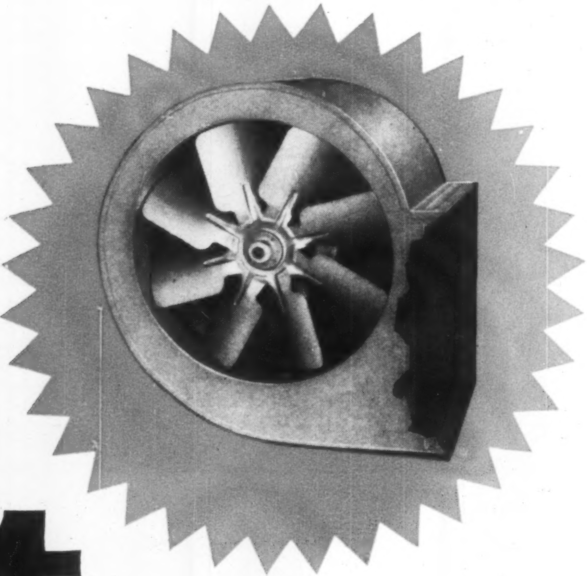
The Torrington RX Radiax blower introduces a new development in air impeller engineering.

It is a direct drive mixed-flow unit employing an exclusive Torrington design concept which results in the conversion of axially-developed air pressure into a radial flow pattern.

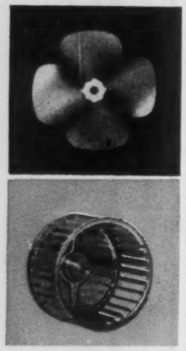
The result of this design breakthrough is a versatile unit that can be tailored to an extended range of customer needs by modification of the axial fan configuration to exact performance specifications. This eliminates dependence upon a variety of different sized units for varying requirements.

The RX offers three important advantages:

PERFORMANCE—A flat power curve makes it a non-overloading unit, permitting the use of a single smaller-capacity motor for varying applications, and availability of the unit in sizes heretofore too large for direct drive applications.



1st



CONSTRUCTION—A vertical center panel divides the unit longitudinally and supports the motor at its center of gravity. Resilient motor and fan mountings minimize noise and vibration. Result is quiet performance, and easy assembly and service.

ECONOMY—The basic design permits size reductions of as much as 36 per cent in the cubic dimensions of the unit, without sacrifice of performance. Thus, the RX is a thinner, more compact unit that can be fitted into tighter areas without choking of air intakes.

The design and performance of the RX give it a versatility that is of special importance to design engineers of air moving equipment. Full specifications are available.

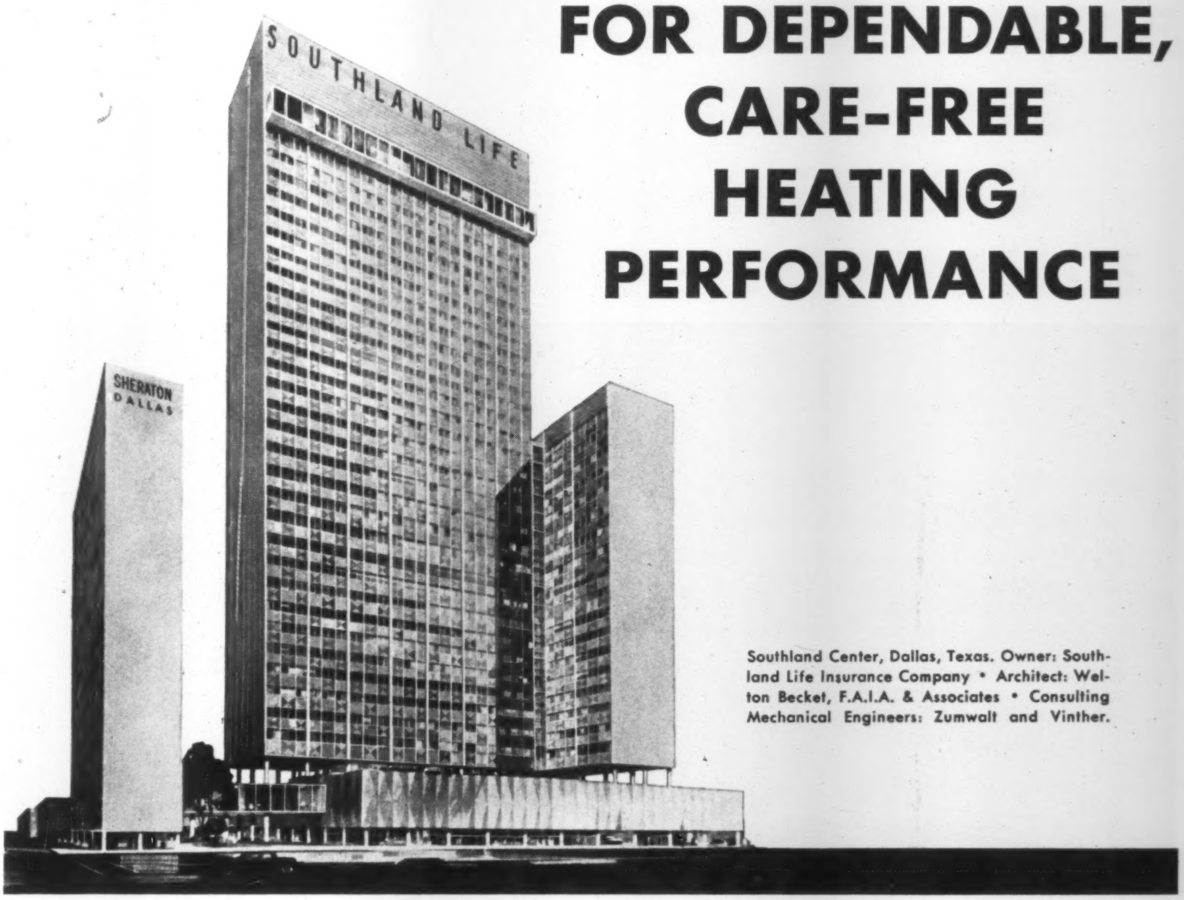
THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO

Multi-million dollar Southland Center selects—

5 WEBCO-RAY 600 hp
1 WEBCO-RAY 100 hp

FOR DEPENDABLE, CARE-FREE HEATING PERFORMANCE



Southland Center, Dallas, Texas. Owner: Southland Life Insurance Company • Architect: Welton Becket, F.A.I.A. & Associates • Consulting Mechanical Engineers: Zumwalt and Vinther.

The efficient performance of Webco-Ray units, backed by these two Companies' Western dealer network for fast local service, are important reasons for their selection in this new multi-million dollar center. As a matter of fact, Western Boiler Company has selected reliable Ray burners as *standard equipment* on all its packaged heating, power and process steam units. 80 plus percent efficiency, compact design (Webco-Ray units occupy less floor space), and easy tube access for cleaning are some of the many quality advantages of these units. Webco-Ray units are available in Forced Draft, Induced Draft and Pressure Forced Draft models in sizes up to 600 hp.

RAY IS THE WORLD'S LARGEST BURNER SUPPLIER FOR BOILER-BURNER UNITS

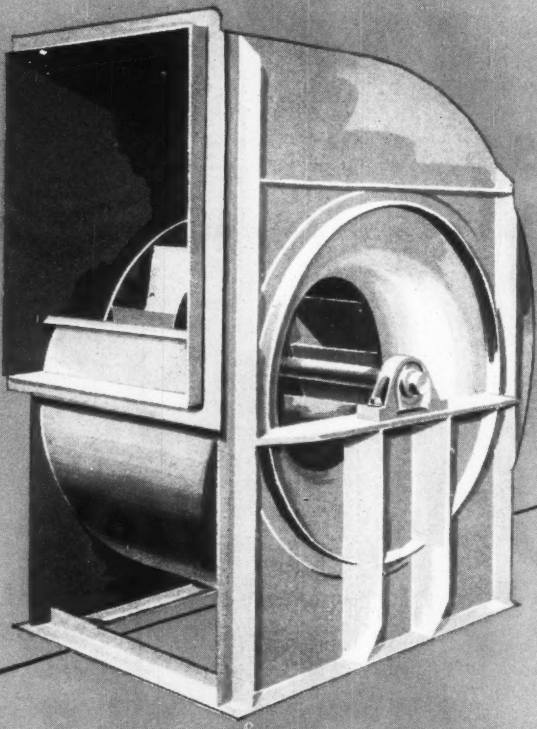
WEBCO
3 PASS PACKAGED UNITS

RAY BURNER COMPANY
1301 San Jose Avenue
San Francisco, California

The Burner with International Reputation RAY

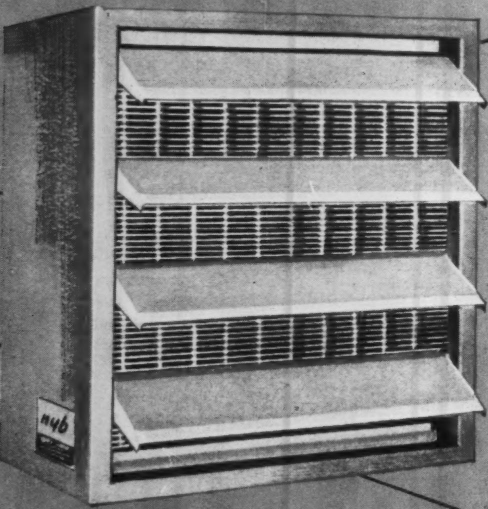
4460

3 maximum efficiency units to solve your air handling problems . . .



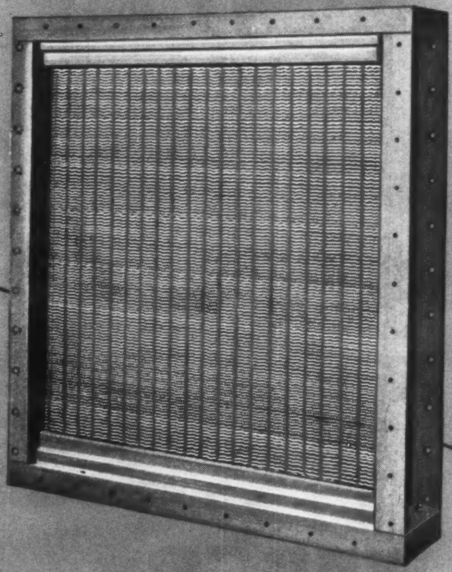
IPL FANS

For standard duty and heavy industrial use . . . quiet, non-overloading compact . . . available in all standard classes and constructions . . . capacities from 1000 to 250,000 CFM against resistance of free delivery to 12" static pressure . . . bulletins 544 and 561.



UNIT HEATERS

For continuous service and efficient operation . . . both horizontal and vertical type . . . complete flexibility with high diffusion and quiet operation . . . wide range of capacities, 10 basic sizes . . . bulletins 552 and 553.

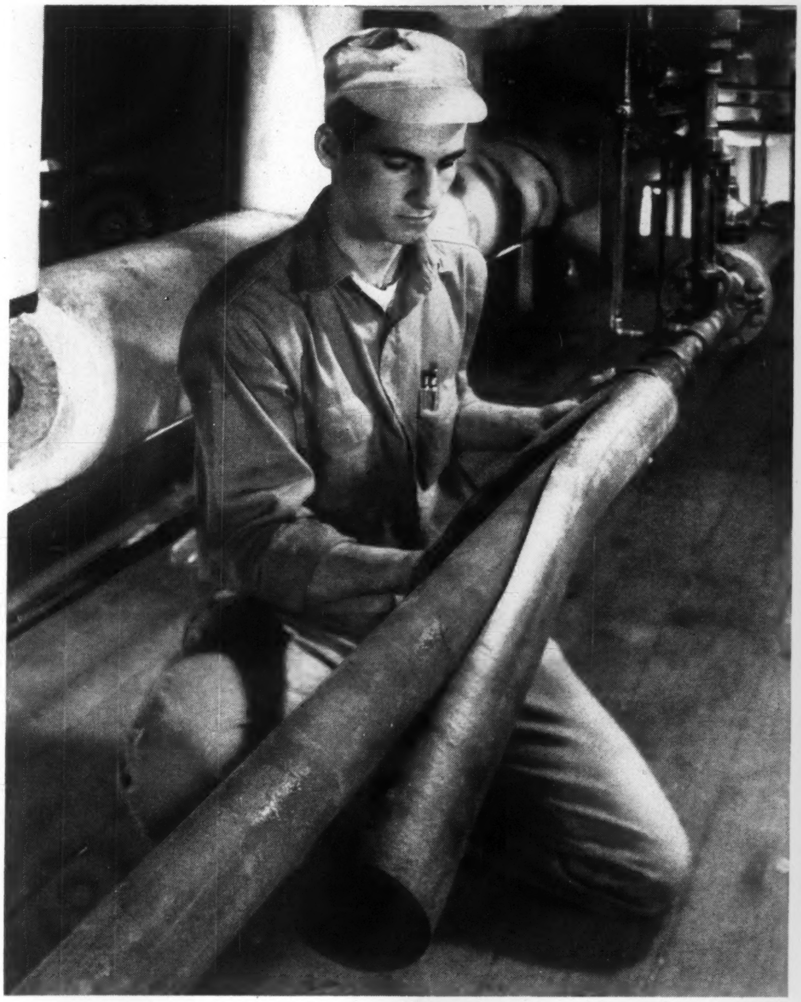


STEELFIN

Heavy duty heat surface . . . corrosion-resistant, constructed of alloy steel, increasing strength without adding to weight . . . hot dip metallic coating over all, including headers, affords perfect bonding and conductivity . . . unprecedented record of trouble-free service . . . bulletin 571.

nyb THE NEW YORK BLOWER COMPANY

SALES OFFICES: 3149 SOUTH SHIELDS AVENUE • CHICAGO 16



Stop condensation on fluid lines with economical, easy-to-apply Armstrong Armaflex.

Fast, easy fabrication of fitting covers is done by miter-cutting pieces of Armaflex Pipe Covering and cementing them together with Armstrong 520 Adhesive.

Sleeving a flange or screwed fitting is easy with new Armstrong Armaflex Pipe Covering or Sheet Insulation. Simply cut a piece of proper size and seal it in place with Armstrong 520 Adhesive.

New insulation goes on fast over cooling and heating lines

New Armstrong Armaflex® helps you cut installation time as much as 50% on air-conditioning, heating, and hot and cold water lines.

When lines are already installed, pieces of Armaflex slit lengthwise are snapped over the pipe and sealed with Armstrong 520 Adhesive. Chillers, water tanks, and large diameter piping are insulated with sheets of Armaflex adhered with Armstrong 520 Adhesive.

Unslit tubes of Armaflex Pipe Covering can be slipped right over pipes and copper tubing before installation. Because Armaflex is highly flexible, it follows contours, curves, or bends readily without any special cutting or fitting.

Armaflex is a foamed plastic insulation with a low k factor of 0.28 at 75°F. to assure ample protection against condensation. Clean to work with, Armaflex will not chip, crumble, or rub off. Available in 6′ lengths, nominal ⅜″, ½″, and ¾″ wall thicknesses, for pipes and tubing up to 3½″ o.d., and in 30″ x 36″ sheets, up to ⅞″ thick.

Free booklet gives complete details. Write Armstrong Cork Company, 2211 Sherman Street, Lancaster, Pennsylvania.

Armstrong INSULATIONS

for temperatures from −300° F. to +2000° F.

Specify

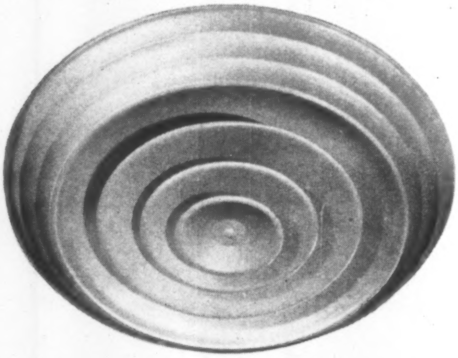
REGARDLESS OF YOUR FORCED AIR DISTRIBUTION REQUIREMENTS!

From the ceiling . . . from the sidewall . . . from the floor . . . wherever and whatever the air distribution requirement . . . the answer can be found in the Carnes complete, quality line of diffusers, registers and grilles and baseboard. This unusually complete line gives you the advantage of one source to supply your requirements . . . be it a residential return grille or a forced air baseboard of any size residential or commercial installation. Unexcelled in quality, manufactured to the most rigid specifications, tested and proved — to specify the best, specify Carnes!

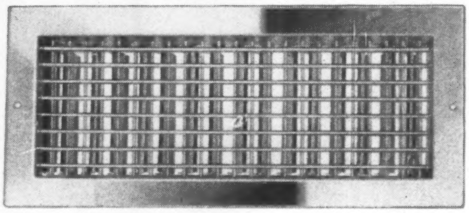
CARNES
CORPORATION
Verona, Wisconsin

FROM THE CEILING . . .

ROUND DIFFUSER Featuring easy installation; fast, simple balancing and adjusting. Deep ceiling plate prevents ceiling aging and eliminates need for anti-smudge rings. Model EJ (fully adjustable) and Model E (fixed cone) are both ideal for use in exposed ductwork or flush mounting. Available in other models, too, in a wide range of sizes.

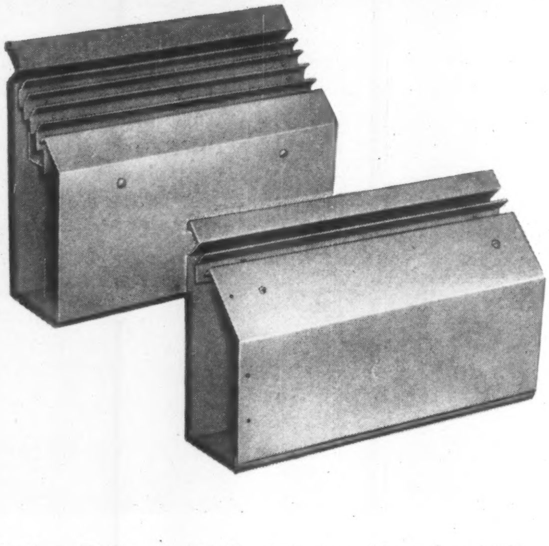


FROM THE SIDEWALL . . .

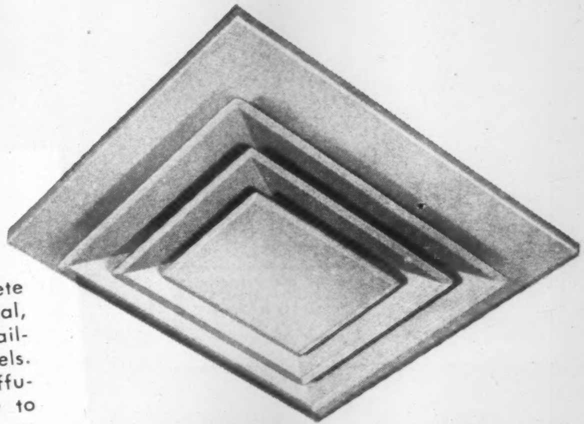


SUPPLY AIR REGISTER Double deflector, triple bank register featuring complete flexibility of directional control of air stream for both vertical and horizontal patterns. Sturdily built blades, 18-gauge steel construction, solid corners, rounded edges.

FROM THE FLOOR . . .



CARNES DIFFUSERS



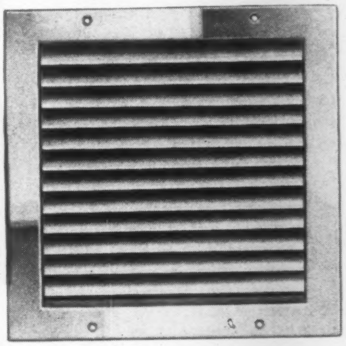
Carnes diffusers are designed to provide a complete selection of air distribution and patterns. Vertical, intermediate and horizontal patterns are all available — in both adjustable and convertible models. Whatever the requirements, there's a Carnes diffuser to fulfill the need — from one-way blow to square and rectangular diffusers with a full, even 360° air pattern. Write for complete information on all Carnes diffusers. Ask for Catalog No. 56.

CONVERTIBLE SQUARE DIFFUSER A 3-in-1 diffuser for all heating and cooling applications — and adjustable to obtain any desired air pattern. Simplest installation possible, shipped completely assembled. Available with opposed blade damper as an integral part of the unit.

CARNES REGISTERS and GRILLES

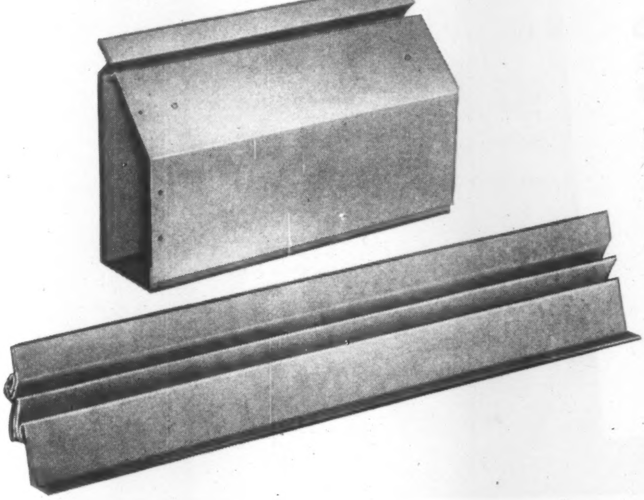
AVAILABLE IN ALUMINUM OR STAINLESS STEEL

Carnes registers and grilles are available in either all-aluminum or stainless steel. The standard finish is baked aluminum enamel, also available with a prime coat if refinishing is desired. A choice of other finishes is also available. Complete information furnished promptly upon request. Please ask for Catalog No. 76-D.



A complete line of rectangular and square return air grilles can be furnished by Carnes. Either fixed or adjustable, vertical or horizontal models are available. Frames are 18-gauge steel with filled corners and rounded edges.

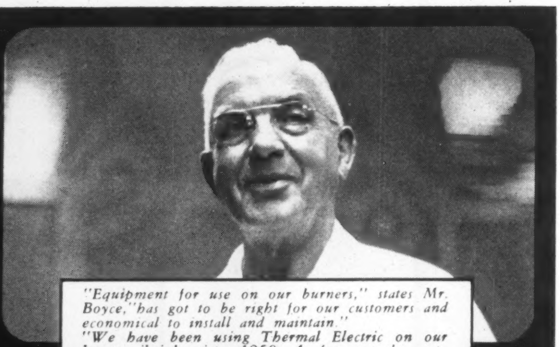
CARNES BRANDES WALL BASE



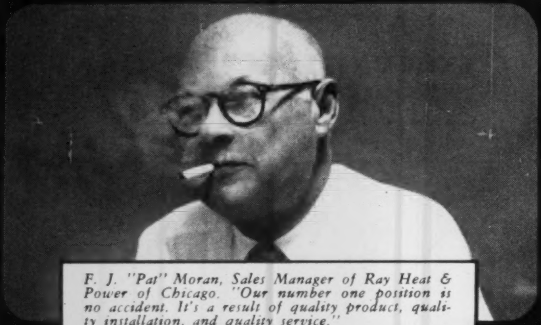
Illustrated, to show the complete and varied selections possible with Carnes-Brandes baseboard, are models designed to meet the needs of architects and engineers for exacting job requirements. There are, of course, standard models for all commercial and residential applications. All utilize the exclusive Carnes-Brandes adjustability for control of outlet air velocities. For complete information, ask for Catalog No. 107.

For free samples, write, using your firm letterhead.

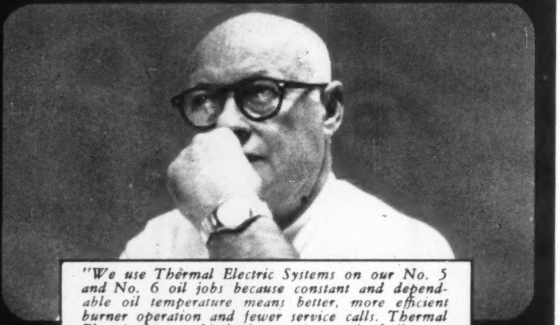
Mr. Michael J. Boyce, owner and President of Ray Heat & Power of Chicago, the largest CI oil burner dealership in the United States. "Mike" is a 72-year-old Son-of-Erin with over thirty-five of those years devoted to oil burner sales and service.



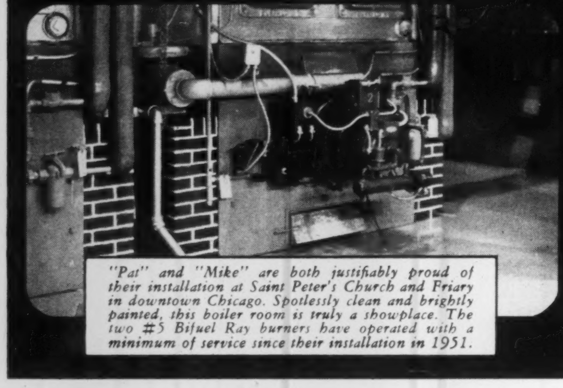
"Equipment for use on our burners," states Mr. Boyce,"has got to be right for our customers and economical to install and maintain."
"We have been using Thermal Electric on our heavy oil jobs since 1950. As far as we're concerned, there is no substitute."



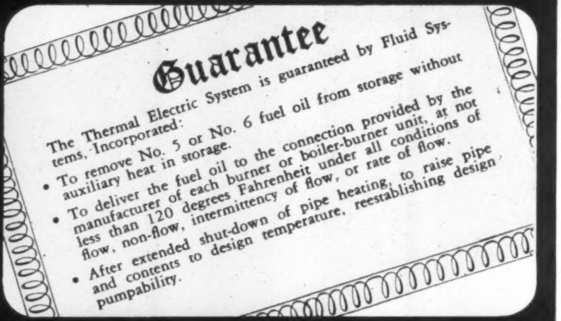
F. J. "Pat" Moran, Sales Manager of Ray Heat & Power of Chicago. "Our number one position is no accident. It's a result of quality product, quality installation, and quality service."



"We use Thermal Electric Systems on our No. 5 and No. 6 oil jobs because constant and dependable oil temperature means better, more efficient burner operation and fewer service calls. Thermal Electric fits our kind of operation perfectly."



"Pat" and "Mike" are both justifiably proud of their installation at Saint Peter's Church and Friary in downtown Chicago. Spotlessly clean and brightly painted, this boiler room is truly a showplace. The two #5 Bifuel Ray burners have operated with a minimum of service since their installation in 1951.



Guarantee

The Thermal Electric System is guaranteed by Fluid Systems, Incorporated:

- To remove No. 5 or No. 6 fuel oil from storage without auxiliary heat in storage.
- To deliver the fuel oil to the connection provided by the manufacturer of each burner or boiler-burner unit, at not less than 120 degrees Fahrenheit under all conditions of flow, non-flow, intermittency of flow, or rate of flow.
- After extended shut-down of pipe heating, to raise pipe and contents to design temperature, reestablishing design pumpability.

"PAT" and "MIKE" agree—There's no substitute for THERMAL ELECTRIC® SYSTEMS

Oil from the tank to the burner connection is always kept at the correct temperature for a clean, safe, 100% automatic start-up, when you install a Thermal Electric System. No maintenance problems. No moving parts. Thermal Electric can be used with any make residual oil burner. The Oil Burner Thermal Electric System is listed under Reexamination Service of Underwriters' Laboratories, Inc.

FLUID SYSTEMS, INC.
1881 DIXWELL AVENUE
NEW HAVEN 14, CONNECTICUT

Gentlemen:
I'd like more information.
☐ 20-page handbook on Thermal Electric
☐ Underwriters' Laboratories Report MP 2047
☐ Have your representative call.

NAME .... **TITLE** ....
COMPANY ....
ADDRESS ....
CITY .... **ZONE** .... **STATE** ....

The Thermal Electric System is listed under Reexamination Service of Underwriters' Laboratories, Inc.

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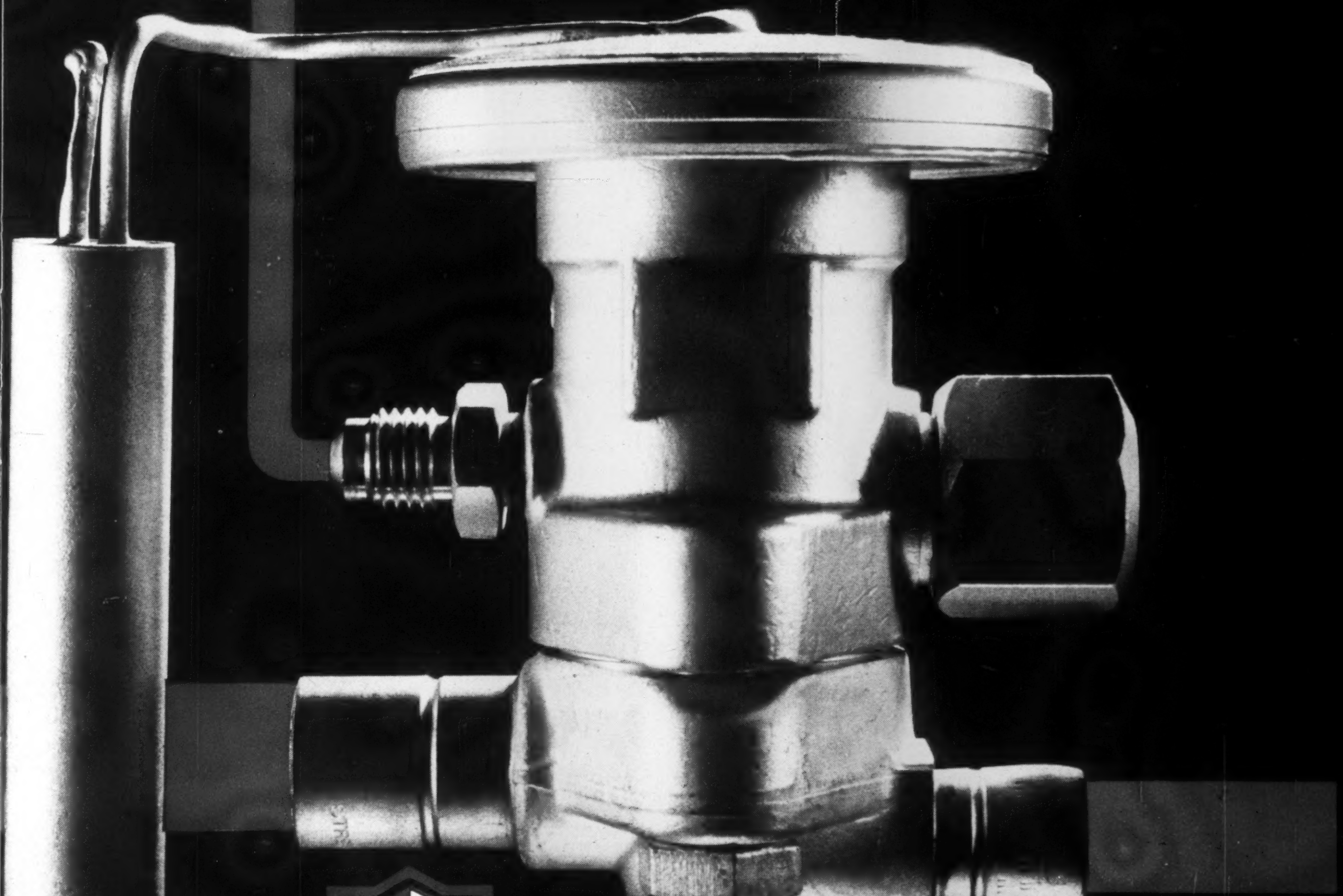
Fluid Systems INC.

READY
TO
INSTALL
OR
SERVICE
IN
SECONDS!

ALCO "T"
SERIES
THERMO
VALVES

They come apart in
the line.
No torch, saw or
tube cutter needed!
You save time and trouble!

SEE THEM AT OUR
BOOTH 444
AT CHICAGO, NOV. 18-21.



ALCO

ALCO VALVE CO.
861 KINGSLAND AVENUE • ST. LOUIS 5, MO.

7800

NEARLY everybody is heading towards Wolverine Tube for ALUMINUM

Why?

Because people like to beat a path to the door of a company like Wolverine—one which puts the personal touch into its dealings with customers. For one thing, they like the I.O.A. program at Wolverine—the Individual Order Attention that is given every customer's requirements. Another step in the right direction is Wolverine's Tubemanship philosophy—the blending of tube-making experience, research, engineering and quality control. If you need aluminum tube—drawn or extruded—or extruded aluminum shapes, make tracks to Wolverine. Remember, too, that Wolverine is also widely recognized as a leading supplier of top quality copper and copper-base alloy tubing—available in a wide range of sizes, types and alloys. A good start: write for Wolverine's General Products Catalog.

CALUMET & HECLA, INC.
CALUMET DIVISION
WOLVERINE TUBE DIVISION
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CALUMET & HECLA OF CANADA LIMITED
CANADA VULCANIZER AND EQUIPMENT COMPANY LIMITED

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Division of Calumet & Hecla, Inc.
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Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

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MAGNET DUST-MAGNET
DUST-MAGNET DUST-MAGNET DU

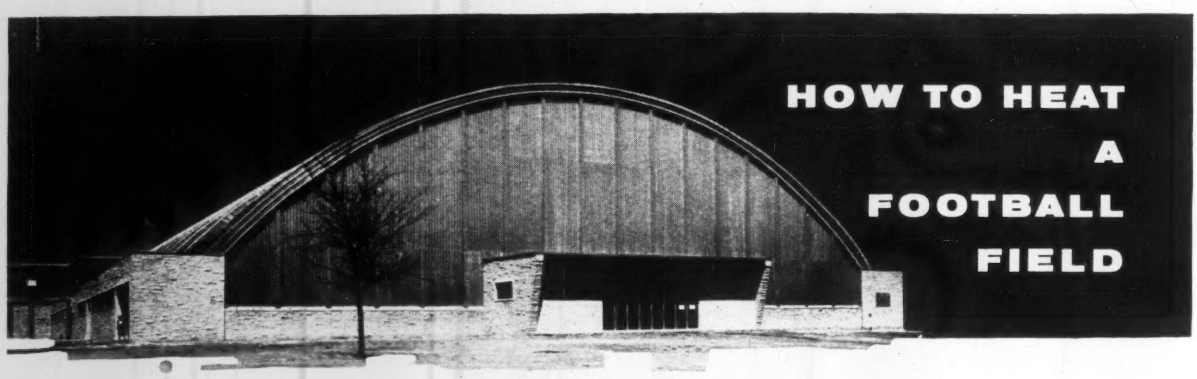
HERE'S THE STUFF FOR CUSTOMER SATISFACTION!

This is polystyrene, the miracle electrostatic plastic developed for exclusive use in Dust-magnet air filters. The fibers of the filter maintain a charge attracting dust particles that would easily pass through ordinary materials. It resists humidity and heat. Requires no treatment or service other than occasional rinsings in clear water. Thousands of Dust-magnet filters have been sold to air-conditioner and furnace manufacturers—they have been rigidly tested in the lab and field. In eight seasons of operation, not one complaint has been received! Install Dust-magnets in your heating and air conditioning units—write or call STODDARD INDUSTRIES, INC., 1545 Kingsbury Street, Chicago 22. Telephone MOhawk 4-1650.

DUST*-magnet

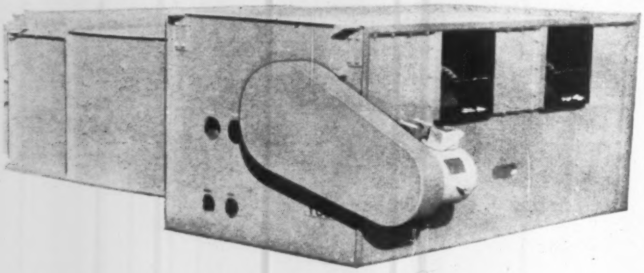
The lifetime filter that washes clean in a jiffy!

*** A Product of**
STODDARD INDUSTRIES



HOW TO HEAT A FOOTBALL FIELD

UNIVERSITY BUILDING HOUSES FULL-SIZE FOOTBALL FIELD PLUS TRACK PERIMETER AND BASEBALL DIAMOND

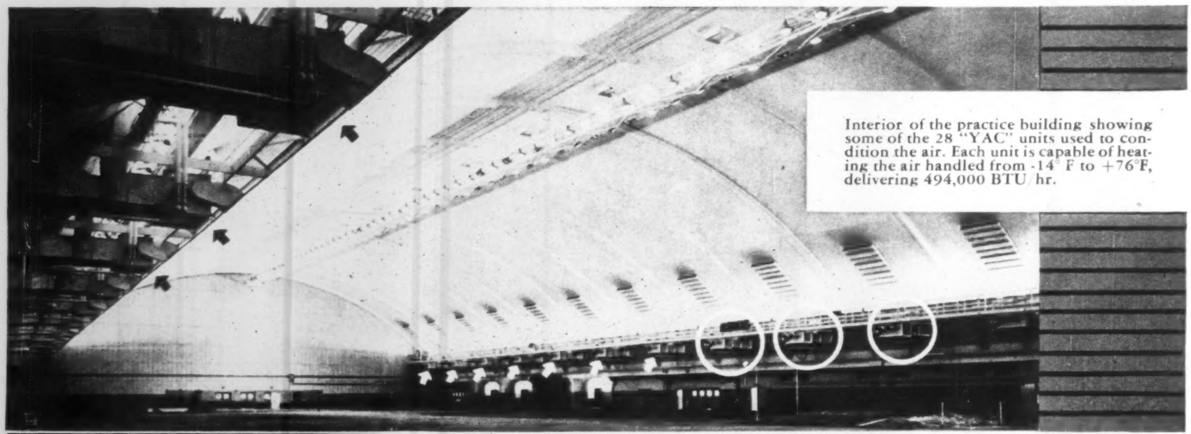


Architect: Scott, Kloppenburg & Scott, Milwaukee
Engineer: Ammann & Whitney, New York
Gen. Cont.: J. L. Simmons Co., Chicago
Mech. Cont.: C. A. Hooper Co., Madison

Young does it with 28 "YAC" UNITS

At a leading Midwestern university, the practice building employs Young "YAC" units for heating and ventilation.

Easy to select, easy to install, simple to service and quiet in operation, Young "YAC" units are available in nine sizes and in horizontal and vertical types. They may be used to furnish any combination of heating, cooling, dehumidifying, ventilation and filtering.



Interior of the practice building showing some of the 28 "YAC" units used to condition the air. Each unit is capable of heating the air handled from -14° F to +76°F, delivering 494,000 BTU/hr.

Young RADIATOR COMPANY

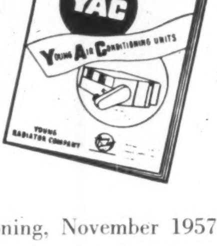
RACINE, WISCONSIN

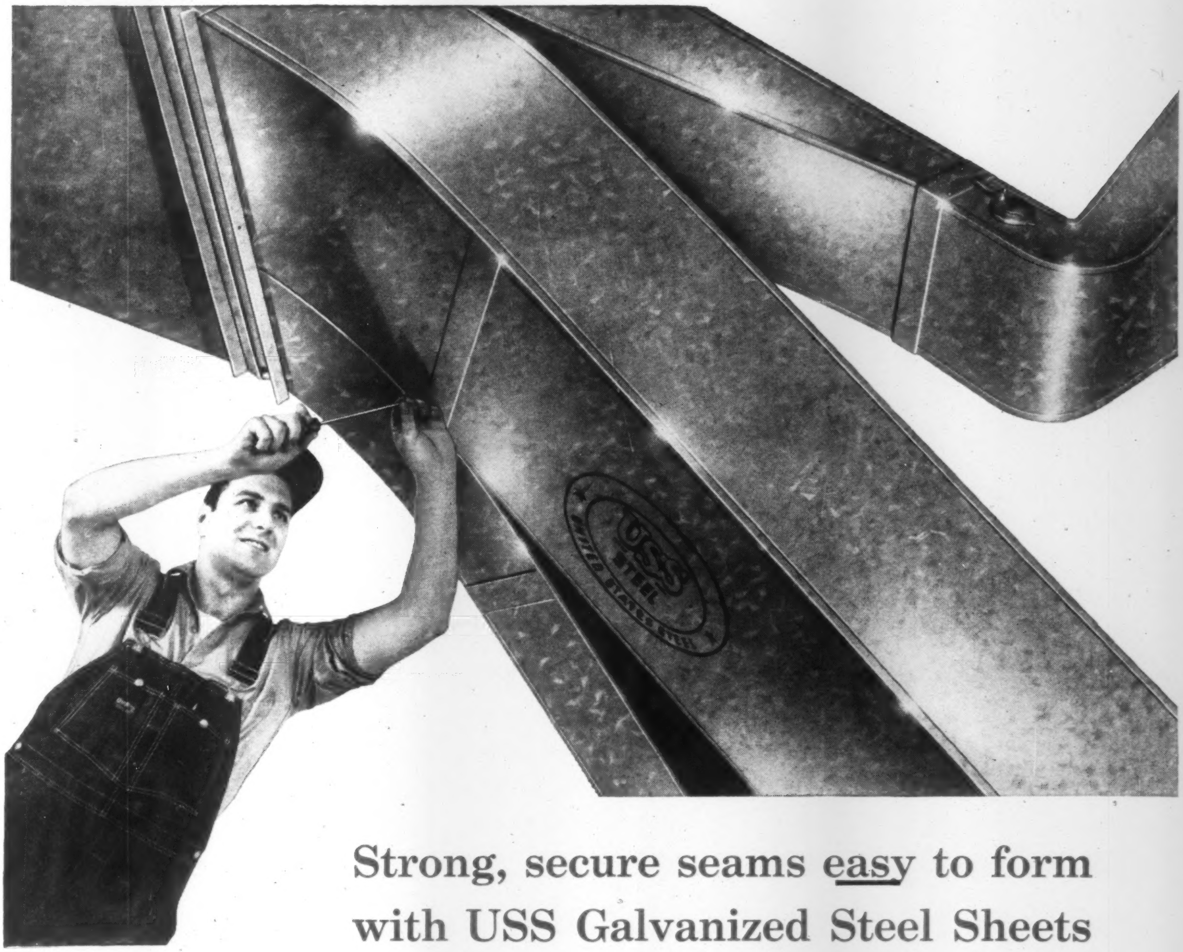
Creative HEAT TRANSFER ENGINEERS

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

solving heating problems is our business . . .

Whatever your heating or cooling problem may be, let our experience provide the solution. Call or write Dept. 517-L for Catalog No. 7554-A.





Strong, secure seams easy to form with USS Galvanized Steel Sheets

Intricate and difficult ductwork installations are easier to make, and the finished job is strong and good-looking, when you use USS Galvanized Steel Sheets.

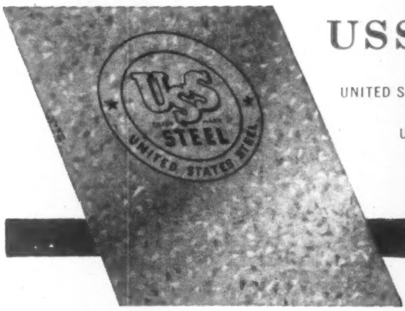
To make sharp angle bends and tight seams you need a galvanized sheet which is strong and sturdy, yet ductile enough to form whatever shape is required. Such a sheet is USS Galvanized Steel. You can bend, cut, stamp, weld, solder, shape, lock-seam, roll or form a USS Galvanized Steel Sheet . . . and the tightly adhering coating of zinc will not chip, flake or crack. And because USS Galvanized Steel Sheets make such a good appearance, your customers will be better satisfied with their new heating or air-conditioning system.

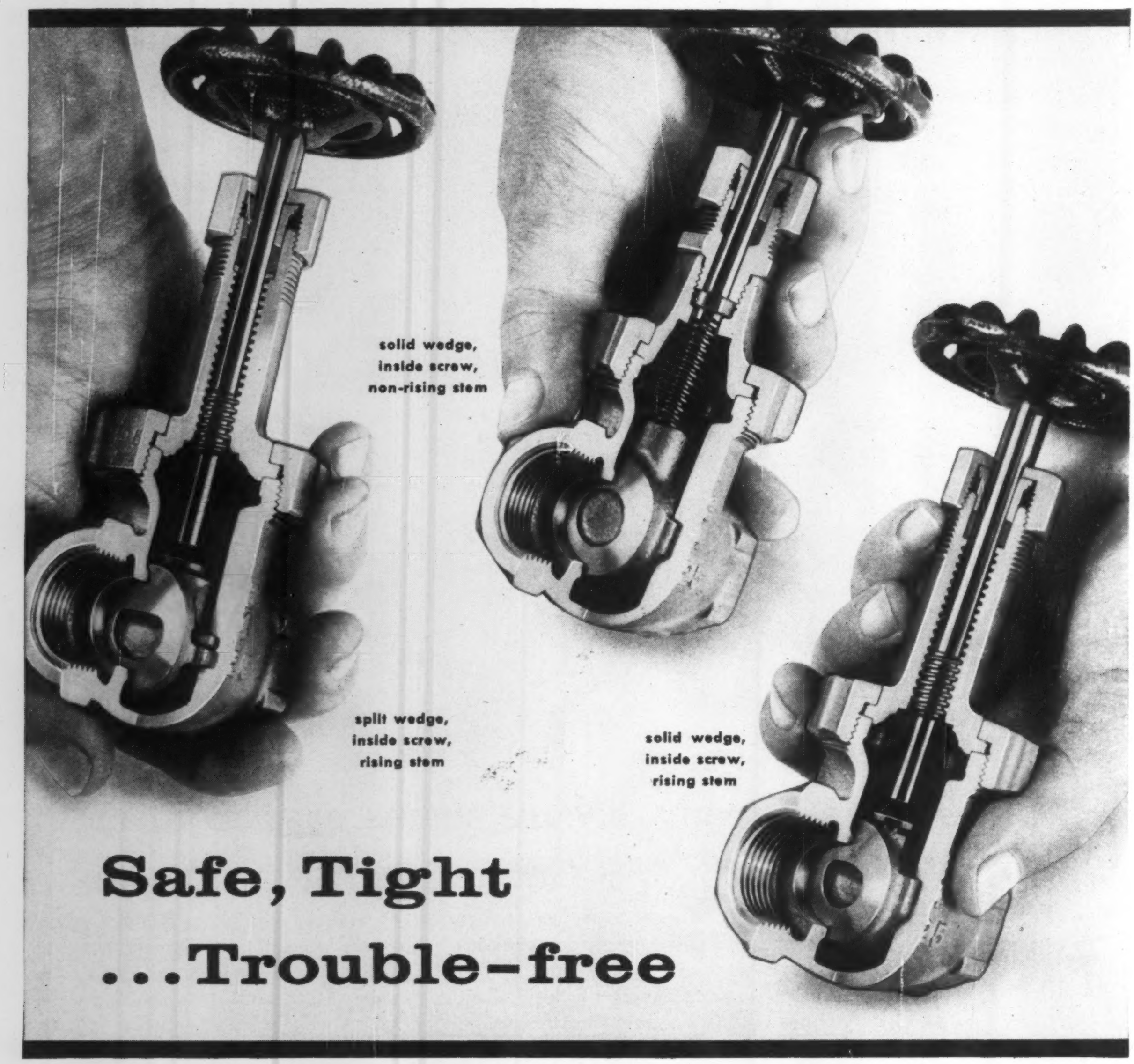
For more information about these superior quality USS Galvanized Steel Sheets, get in touch with the nearest Sales Office of United States Steel. Your local steel distributor can give you fast delivery of USS Galvanized Steel Sheets. Let his stock serve as your inventory.

USS GALVANIZED STEEL SHEETS

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL




solid wedge,
inside screw,
non-rising stem
split wedge,
inside screw,
rising stem
solid wedge,
inside screw,
rising stem
Safe, Tight
...Trouble-free

. . . with *union* body-bonnet joint on 125 lb., 150 lb., 200 lb. pressure classes

Be safer—and save! Greater operating safety, positive shutoff, and low upkeep costs are the prime advantages of modern OIC bronze gate valve designs in all pressure classes.

Union ring nut provides safety-tight body-bonnet joint

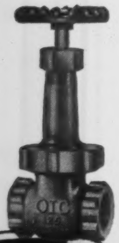
The separate union nut seals the bonnet and body mating surfaces, effecting a tight, leak-proof joint. Possibility of distorting body and bonnet during disassembly and assembly and of loosening the joint during operation are virtually eliminated.

OIC design reduces maintenance costs

Necessity for stem replacement can be forgotten, because stems are special, long-lived OIC *Alloy-40.* This sturdy material eliminates galling and seizing and contributes to easy operation.

Stem threads are never exposed to line fluids in open or closed positions (125 lb. and 150 lb.), preventing thread abrasion from line fluids or suspended solids.

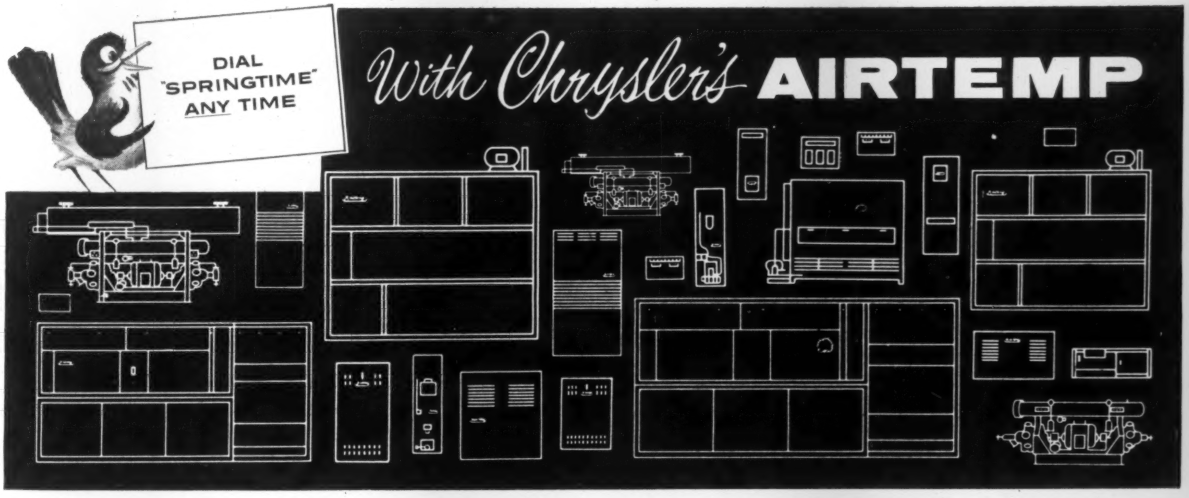
All pressure parts are designed for maximum strength, and working parts are hydrostatically tested for positive sealing and seating. Write for our folder, No. 1006. ***Order from your OIC distributor.***



OIC
FOUNDED 1883

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

VALVES | **FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON VALVES**



287 AIRTEMP MODELS assure

"Exactly-Right" Air Conditioning for Every Project!

Good news for engineers! With the AIRTEMP choice of 287 models, you are assured an air-conditioning system precisely suited to every need—at economical "standard model" cost.

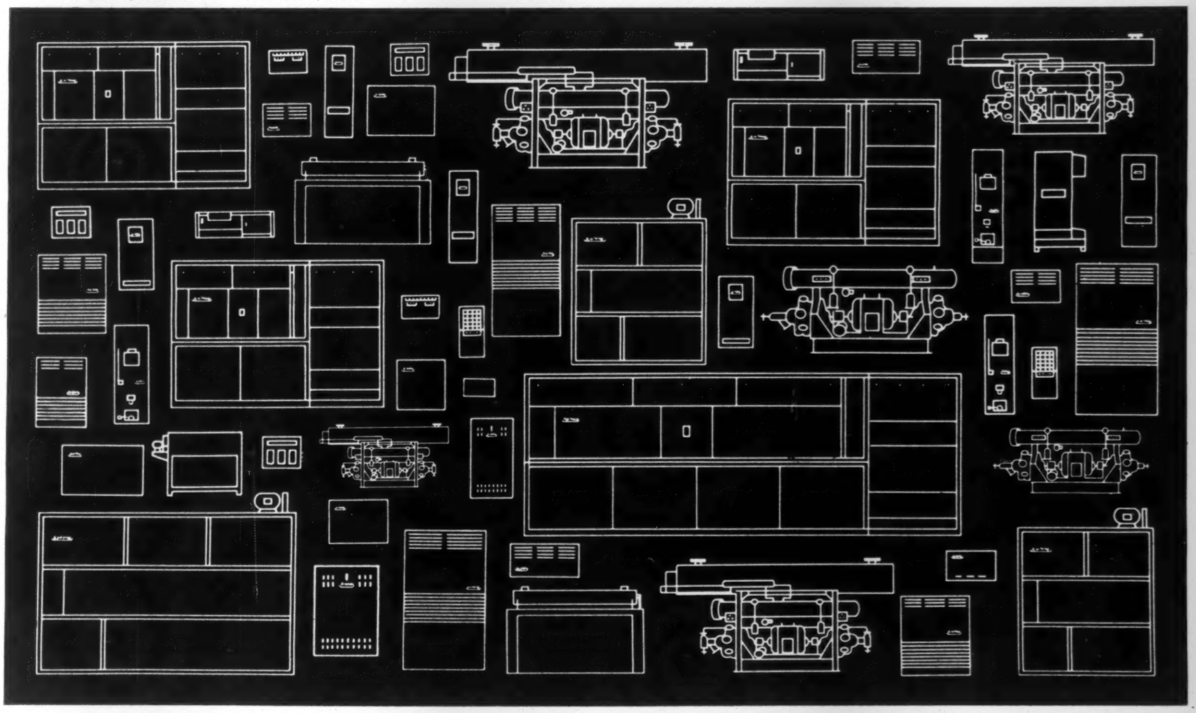
This means no compromising with models too big or too small for your air-conditioning needs . . . and a surprisingly great reduction in the need for custom-designed installations.

Your AIRTEMP dealer or contractor offers a complete selection of air-conditioning equipment, too. This includes air- and water-cooled "packaged" air conditioners, central systems, centrifugal chillers, and individual room air conditioners. Phone your factory-trained AIRTEMP dealer. He's in your Yellow Pages.

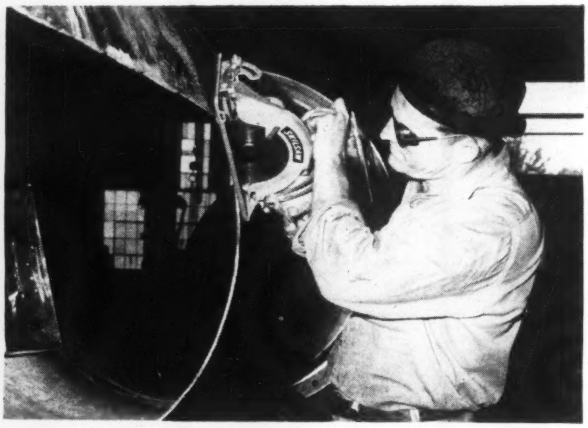
Remember, when you specify AIRTEMP you specify Chrysler, a name well-known for quality and advanced engineering.

Airtemp CONSTRUCTION the most complete selection of air conditioners

DIVISION OF
CHRYSLER CORPORATION DAYTON 1, OHIO



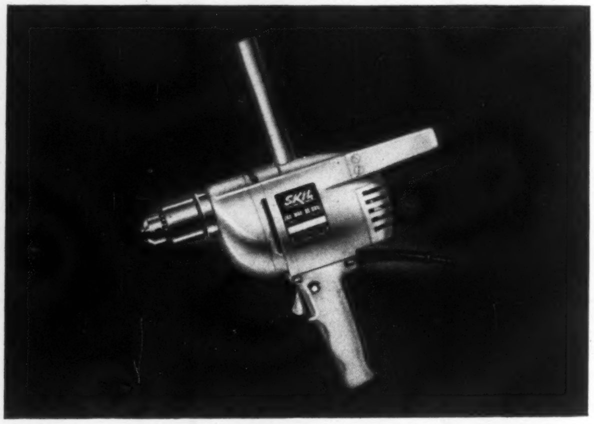
Saves $100 maintenance costs. Mr. Edward Staubitz, Treasurer of the Staubitz Sheet Metal Works, Cincinnati, says this about SKIL tools: "When we were shown a SKIL Model 852 Disc Sander, we were told to burn it up if we could. We tried but to no avail. With top usage our records show we saved over $100 on six SKIL sanders over the same period with other models. Our costs dropped 5 to 1."



SKIL Saw pays for itself. "Our SKIL Model 77 Saw paid for itself on the first job of metal cutting," says Mr. Greenway, superintendent of the Alpha Tank and Metal Manufacturing Co., St. Louis. "It completed the job four times faster. We use it to cut aluminum, copper and other materials. Cuts are required in all sizes and shapes. Our SKIL saw definitely is the handiest tool in the shop."

MECHANICAL CONTRACTORS SAVE with SKIL Tools

Saves servicing. West Brothers Sheet Metal Works, Atlanta, have used SKIL tools for 25 years in their shop. Mr. J. Hoyt West says, "We standardize on SKIL drills because they pack power for the toughest assignments. We have had our present SKIL Model 75 drills for over a year. Although they have had days of rough assignments—far above their recommended use—we have yet to have them serviced."



SAVE with NEW ½" Model 80 DRILL. All-new design: shorter, narrower—one pound lighter! New power for fast drilling on the toughest jobs. No matter what you have to drill, cut, sand or grind, there's a SKIL tool to do the job faster, better, cheaper. Let your SKIL distributor show you why. Let him show you the speed, power, versatility and ease of handling of all SKIL power tools.

SKIL
PORTABLE TOOLS

Made only by SKIL Corporation, Chicago 30, Illinois. Factory branches in all leading cities.

Send for
FREE *booklet*
on power tools

SKIL Corporation, HFT-117
5033 Elston Ave.
Chicago 30, Illinois

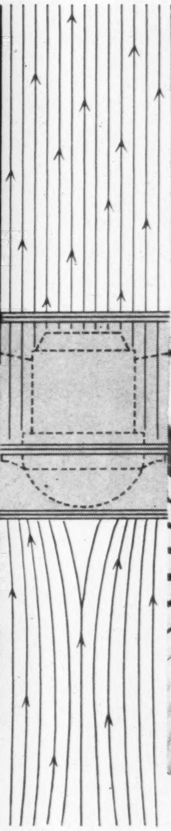
In Canada:
3601 Dundas Street West
Toronto 9, Ontario

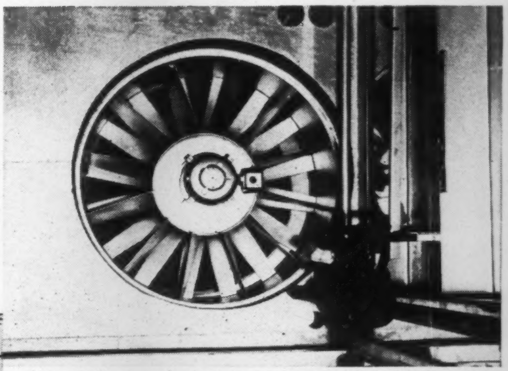
Name________________ Title____________
Address__________________________
City______________ Zone_____ State_____

Joy Axivane

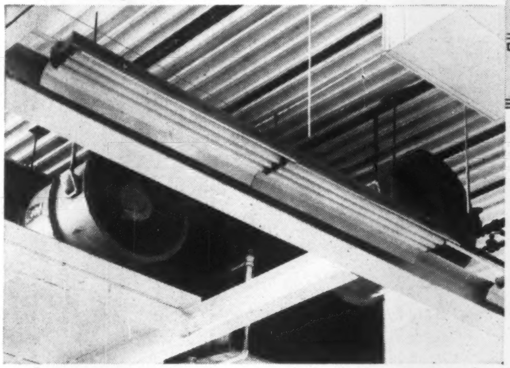
Ventilation Problems: Gone with the Wind

Compact Joy installation at Boqueron, Venezuela, moves huge quantities of air.

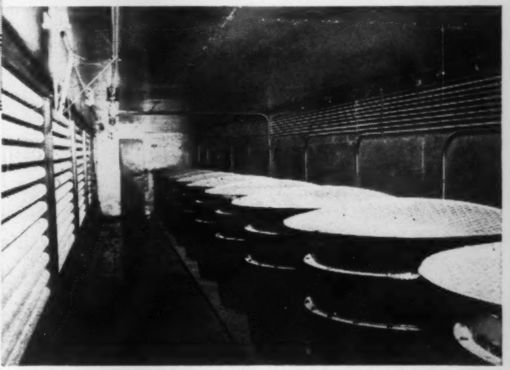




Joy Axivane design means power savings at Alcoa's Texas Plant.



Space-saving Joy fans are installed as part of the duct system at Reliance Electric's Ohio Plant.



Dependable Joy installation circulates freezing air in California Cold Storage Plant.

'Round the World, JOY Handles the Hard Ventilating Jobs

If you have a really tough ventilating job coming up . . . moving large volumes of air . . . variable pressures and volumes . . . unpredictable resistance . . . cramped space allotment . . . better take a look at the Joy Axivane Fan.

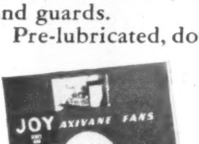
Compact design, with the motor *inside* the fan gives you more air per pound of fan and motor . . . more air per cubic foot of fan. The straight-thru design allows you to install it right *in* the duct; becomes a *part* of the duct; eliminates offsets, elbows, drives and guards.

Pre-lubricated, double-shielded ball bearings permit the fan to be installed in *any* position. Adjustable blades allow for unpredictable resistance . . . permit changes in volume or pressure, *after* the fan is installed.

You choose from a standard line of over 136 models . . . and still have the advantage of Joy's custom engineering service. Joy Axivane Fans can make your next ventilating job a lot easier . . . that's one reason why Joy gets the tough assignments.

Get complete information about Joy Axivane Fans from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

WSW 15840-17



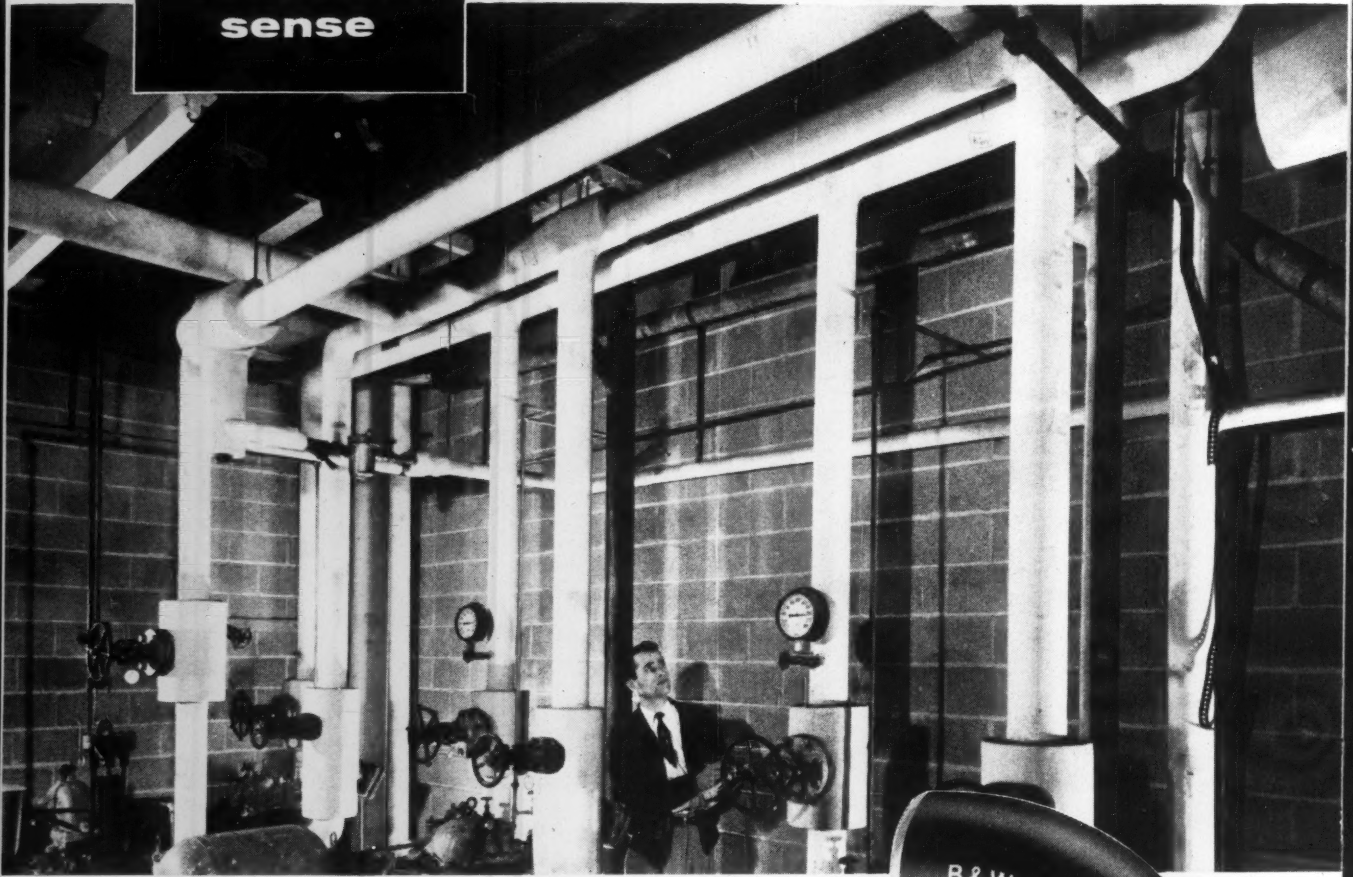
WRITE FOR FREE BULLETIN 17-41

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

STATIONARY AIR and GAS COMPRESSORS • NON-LUBRICATED COMPRESSORS • BOOSTER COMPRESSORS
VACUUM PUMPS • PORTABLE COMPRESSORS • INDUSTRIAL FANS • PORTABLE BLOWERS • FOUNDATION
BREAKERS • HOISTS • ELECTRICAL PLUGS, RECEPTACLES and POWER DISTRIBUTION SYSTEMS

result of an engineer's good common sense

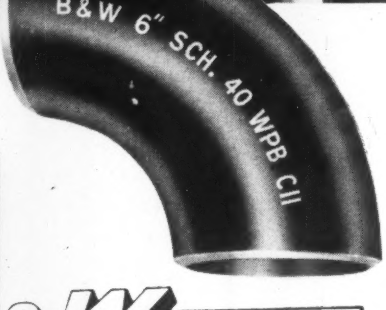
This piping installation is here to stay, thanks to B&W Seamless Welding Fittings



THE engineer who specified B&W Seamless Welding Fittings on this boiler job knew what he was doing. He realized the system would have to be permanent and leakproof for many years to come. He also realized how much time and money could be saved in fabrication, and, of course, insulation. Therefore, it was only natural that he chose welded connections since they actually become part of the piping system and are as strong, or stronger than the pipe itself. Pipes nest closer and the overall system is considerably lighter.

B&W Seamless Welding Fittings are dimensionally accurate. Full radius, true circularity and smooth walls of uniform thickness provide a smooth, fast-moving flow even under highest temperatures and pressures.

This time, specify B&W Seamless Welding Fittings and Forged Steel Flanges for a permanent and leakproof piping system. They're available in a complete range of sizes and types in alloy (B&W CROLOYS) carbon and stainless steels.



THE *NATURAL* SOURCE FOR ALLOY FITTINGS

B&W

TUBULAR PRODUCTS DIVISION

FA-7907-FE3

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION — FITTINGS DEPARTMENT
3839 WEST BURNHAM STREET — MILWAUKEE 46, WISCONSIN

SEAMLESS WELDING FITTINGS AND FORGED STEEL FLANGES, SEAMLESS AND WELDED TUBULAR PRODUCTS — IN CARBON, ALLOY AND STAINLESS STEELS

The Editors' Pages

AIR CONDITIONING takes the spotlight at the 10th Exposition of the Air-Conditioning and Refrigeration Industry at Chicago's International Amphitheater, November 18-21. For a diagram of the floor plan showing booth numbers, the show hours, and an up to date list of exhibitors and the equipment they will display, turn to page 150.

Building Outlays Keep Up, But Future Contracts Lag

. . . construction abreast of August record

OUTLAYS for new construction in September matched the all-time peak of $4.6 billion achieved in August, to round out the most active quarter on record, according to preliminary estimates of the U. S. Depts. of Commerce and Labor.

In September many important types of construction remained at or near the peak levels of August, bringing the value of new work put in place during the first nine months of 1957 to $35 billion, 2 percent more than in the comparable 1956 period.

After adjustment for seasonal factors, this year's third quarter total was at an annual rate of $47.1 billion, compared with the $46.8 billion rate for the first half of 1957 and actual outlays of $46.1 billion for the whole year of 1956.

Total private construction activity reached a new September high chiefly because of the major increase over the year in public utilities. Expenditures for new dwelling units ($1.1 billion) remained at the August level, and the decline from last year's spending on this work had narrowed from 14 percent in April to 8 percent in September.

Although industrial construction continued the downtrend evident since last April, total expenditures for plant expansion during the first nine months of 1957 were still 7 percent above last year's comparable total.

Public construction continued to expand in September. A major gain in this sector for the first nine months of this year was in schools.

Contracts for future construction totalled $2,817,966,000 in August, a decline of 5 percent from the comparable month last year, according to F. W. Dodge Corp.

For the first eight months of 1957, the cumulative total of construction contracts amounted to $22,676,652,000, up 2 percent over the corresponding year earlier period.

August contracts for nonresidential buildings were valued at $1,008,265,000, an increase of 8 percent over August 1956. Commercial manufacturing, educational, hospital, and religious buildings all registered gains over a year ago. Nonresidential building contracts for the first eight months of 1957 totalled $7,939,670, up 3 percent over the first eight months of 1956.

Residential building contracts in August totalled $1,283,513,000, an increase of 5 percent over August 1956. A substantial gain in contracts for multi-unit dwellings more than offset the 1 percent decline reported for one and two family houses. For the first eight months of this year, residential building contracts were valued at $9,053,764,000, down 1 percent from the comparable 1956 period.

Contracts for heavy engineering in August amounted to $526,188,000, down 34 percent from August 1956. (August 1956 was unusually high.) The cumulative total of heavy engineering contracts was reported to be $5,683,218,000, a 7 percent increase over the first eight months of last year. ╪

Contractor Groups Form Joint Policy Committee

. . . to iron out problems

LEADERS in the construction industry have announced the formation of a national joint cooperative committee to study and make recommendations on matters of mutual concern and interest to the construction industry and the public.

The national policy group will be known as the National Joint Cooperative Committee of the Associated General Contractors and the Council of Mechanical Specialty Contracting Industries.

The memberships of these groups include more than 20,000 contractors.

Among subjects confronting the committee are such matters as the trend toward restrictive clauses in labor agreements that limit or curb industrial management's prerogative to perform construction work by contract. Also involved are poorly defined plans and specifications that lead to labor jurisdictional disputes, controversies over materials and methods, and duplicated or lack of insurance coverage. ╪

Gas Industry Sales Show 8.6 Percent Increase in July

. . . over July 1956

TOTAL SALES of the gas utility and pipeline industry in July were 8.6 percent higher than in July 1956, the American Gas Association reports, with natural gas sales rising 9.0 percent on a year-to-year comparison.

The industry reported total sales of 4868 million therms in July to ultimate consumers, compared with 4484 million therms a year earlier. ╪

School Cooling Ups Grades, Hikes Summer Enrollment

. . . at all educational levels

Superior scholastic achievements and air conditioning are hand-in-glove companions in schools from Miami to Montreal and from Boston to Los Angeles, according to Carrier Corp. studies.

Some of the nation's leading educators report that air conditioning improves grades, aids research, increases enrollment, makes year 'round operation practical, extends adult education through the summer, and increases school use for hot weather civic and social functions.

As an indication of present trends, Carrier reports that it has supplied almost as many air conditioning systems in schools during the first seven months of 1957 as during all of 1956.

Dr. R. F. Poole, president of Clemson College in South Carolina states: "Students are more alert and, though it is difficult to measure, we think air conditioning has a beneficial effect upon the grades of summer students. Our faculty has found that air conditioning has helped them immeasurably in the discharge of duties."

But school cooling has not been confined to the top rung of the educational ladder, although it is highest there. Carrier reports that it has supplied about 100 installations in elementary and secondary schools.

El Paso Technical High School had its system placed in operation for the first time this summer. The school reports a remarkable increase in summer enrollment.

School air conditioning is not localized to the South and Southwest. A laboratory at McGill University in Montreal also is conditioned.

The most air conditioned educational plants in the country are in the Southwest, where Southern Methodist University has it installed in 23 of 64 buildings and the University of Texas has it in 14 out of 40.

Tests prove that teaching or learning in excessive heat is difficult. For example, identical examinations were given to students who had the same I.Q.—one group at the University of Minnesota and the other at the University of Cincinnati. All Minnesota students taking the quiz in the comparative comfort of a northern July passed. Only 60 percent passed in warmer Cincinnati. When the test was repeated in December, both groups had about the same scores.

The energy that students are wasting battling environment can be, through air conditioning, turned to studies and other useful pursuits. ╪

Water Used for Cooling "Merely on Loan"

. . . just an increase in temperature

"There is no shortage of water except in specific localities," said Everett P. Partridge, director, Hall Laboratories, Inc., in his presentation of the Edgar Marburg Lecture at the 60th annual meeting of the American Society for Testing Materials in Atlantic City recently.

Dr. Partridge emphasized the use of water as an engineering material and pointed out that industry's needs for water are largely on a loan basis. He said that the bulk of water used by industry is for cooling and, therefore, it is not consumed but merely borrowed and returned at a slightly higher temperature. The amount consumed corresponds to that which evaporates because the temperature is higher.

Industrial water is also used for cooling by evaporation in spray towers and spray ponds. In this case, he noted, the total amount of water borrowed is much less, although the volume consumed may be about the same, as when the water is used for cooling without evaporation. ╪

Need Good Ventilation For New Welding Methods

. . . or health hazards may exist

Inert-gas shielding of the arc and the use of a consumable electrode in welding are certainly improvements over conventional arc welding, but at the same time these processes introduce serious health hazards to the welder due to the ultraviolet radiation, ozone, oxides of nitrogen, and metal fumes produced, according to the *Monthly Review* of the Div. of Industrial Hygiene, State of New York Dept. of Labor.

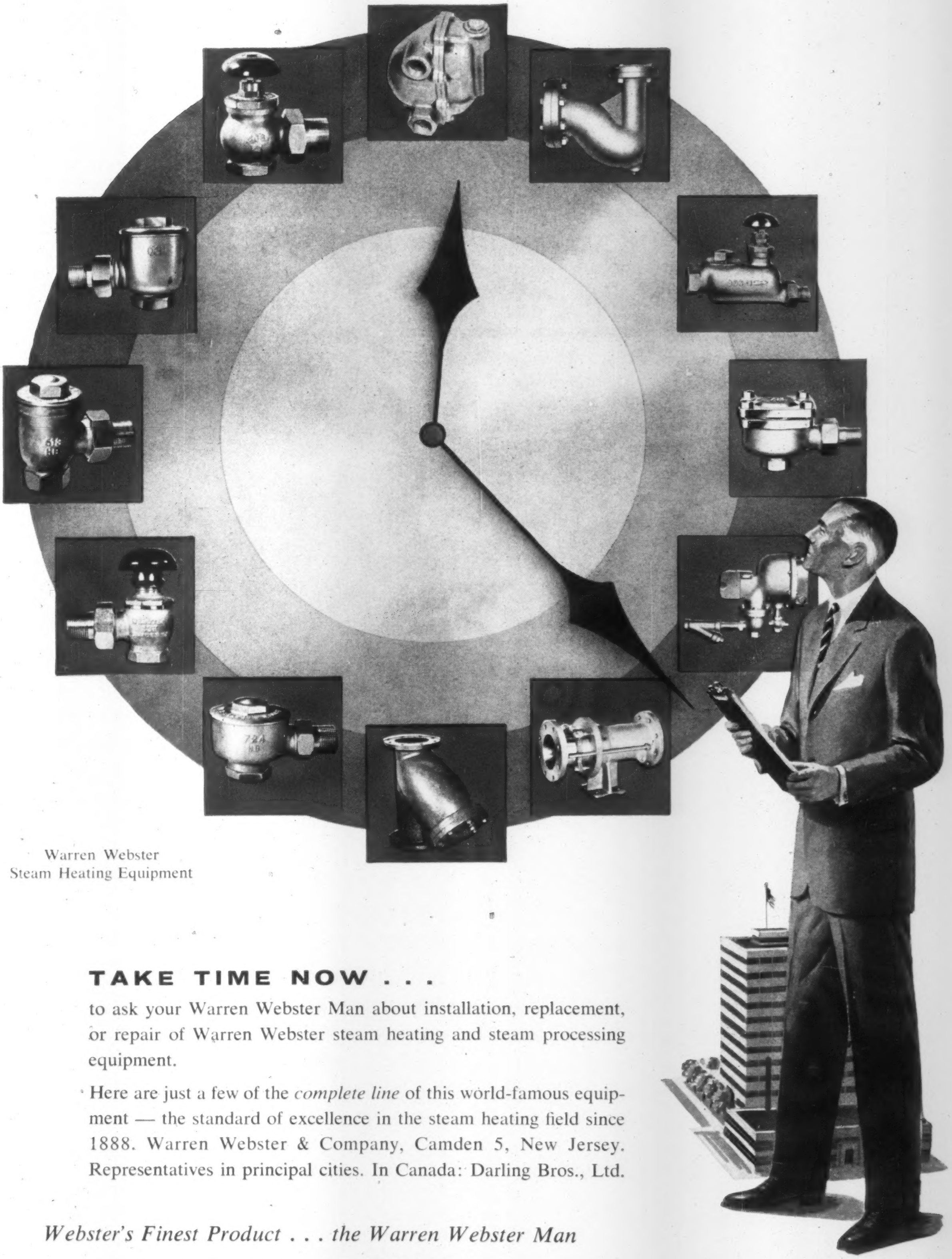
An environmental and medical study in three plants using this welding process disclosed three cases of severe pulmonary irritation due to ozone and several cases of milder illness.

Diagnoses of these cases showed that the early recognition of symptoms, the prompt removal of the worker, and limitation of physical activity are the only preventive measures available medically.

Therefore, control must be predominantly environmental. This consists of adequate exhaust ventilation, both local and general, proper enclosure of the process, and adequate protective devices for the workers. ╪

"Quote"

"Air conditioning has a great present and a greater future. The time will soon be here when it will be as necessary to air condition all inside spaces in the summer as it is to heat them in the winter."—*The Honorable Sinclair Weeks, Secretary of Commerce of the United States, at the opening session of the Government-Industry Symposium on Air-Conditioning, in Washington, D.C., earlier this year.*



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to ask your Warren Webster Man about installation, replacement, or repair of Warren Webster steam heating and steam processing equipment.

Here are just a few of the *complete line* of this world-famous equipment — the standard of excellence in the steam heating field since 1888. Warren Webster & Company, Camden 5, New Jersey. Representatives in principal cities. In Canada: Darling Bros., Ltd.

Webster's Finest Product . . . the Warren Webster Man

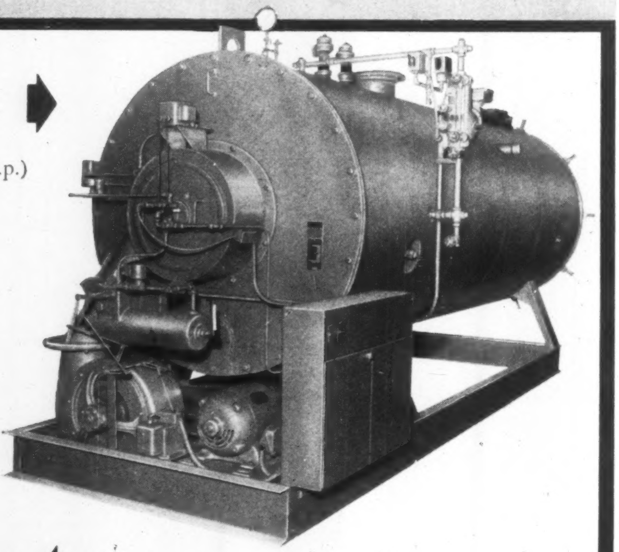
WARREN WEBSTER
HEATING . . . COOLING

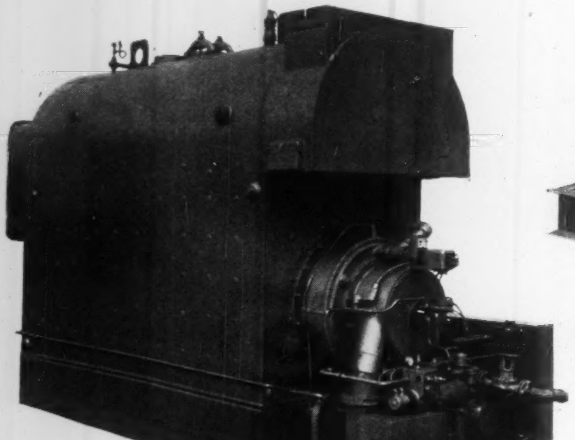
For any type or size of Automatic Boiler . . .

specify YORK-POWER

No longer are automatic boilers limited to one type of boiler. York-Power now offers a complete selection—2-pass Scotch Marines, 3-pass Scotch Marines, and 4-pass Fire Tubes—in a complete range of sizes. All York-Power boilers are automatically fired with oil or gas and can be furnished for combination gas-oil firing. All York-Power automatic boilers are complete on one skid and are fully wired. All York-Power automatic boilers are fire-tested for operational efficiency.

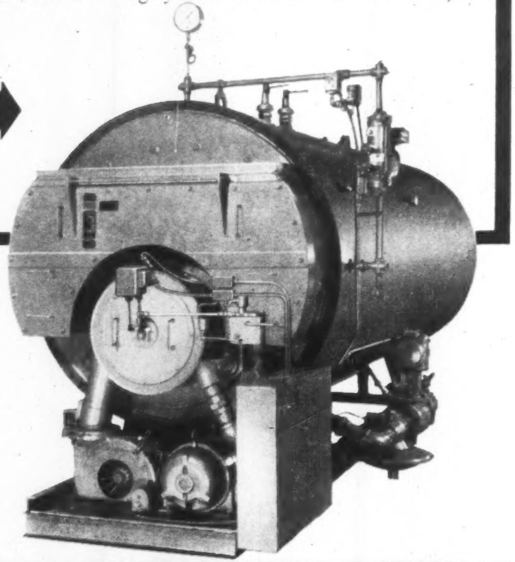
Steam-Pak Automatic Boilers
featuring 3-pass Scotch Marine design ◆ High or Low Pressure Steam or Hot Water ◆ 15 to 600 Horsepower
(Also available in Steam-Pakette design from 10 to 50 h.p.)

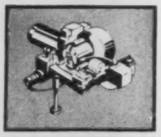


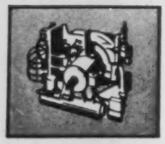


Fire-Pak Automatic Boilers
featuring 4-pass Fire-Tube design ◆ Low Pressure Steam or Hot Water ◆ 35 to 485 Horsepower
(Steam-Pak firing system with forced draft burner)

Scot-Pak Automatic Boilers
featuring 2-pass Scotch Marine design
with either forced, induced or natural draft.
45 to 400 horsepower







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Pioneer Specialists of Automatic Heat and Power
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"Open for Discussion"

• *WE FOLLOW HERE each month the practice at engineering society meetings of providing an "open for discussion" period. You are urged to take part. Just address your comments to the Editors. Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

Air Washer Cooler Only One Mode To Evaporative Cooling Heat Relief

THE ARTICLE *Air Washer Type Evaporative Coolers Reduce High Heat Loads*, in the March HPAC, clearly points out the fact that something can be done about providing relief from the heat in industries such as the laundry and dry cleaning field.

Evaporative cooling is a much neglected technique for obtaining drastic industrial heat relief. Articles such as this one should go a long way in bringing the advantages of evaporative cooling to the attention of engineers and plant operators.

From the article one may get the impression that the air washer evaporative cooler is the only type of cooler that is suitable for this application. This, of course, is not true. Any well engineered and constructed device utilizing the evaporative cooling principle will accomplish the desired results. It is the principle that is important rather than the particular product used.

The success of the cooling system does not depend on any one type of cooler. Commercial air washers, capillary cell air washers, drip type coolers, and rotary coolers are equally as capable as the air washer cooler, or slinger type cooler, as it might be more accurately defined.

ROBERT S. ASH
Asst. to the President
International Metal Products Co.
Phoenix, Ariz.

Add Equalizing Line Between Two Hot Water Storage Tanks

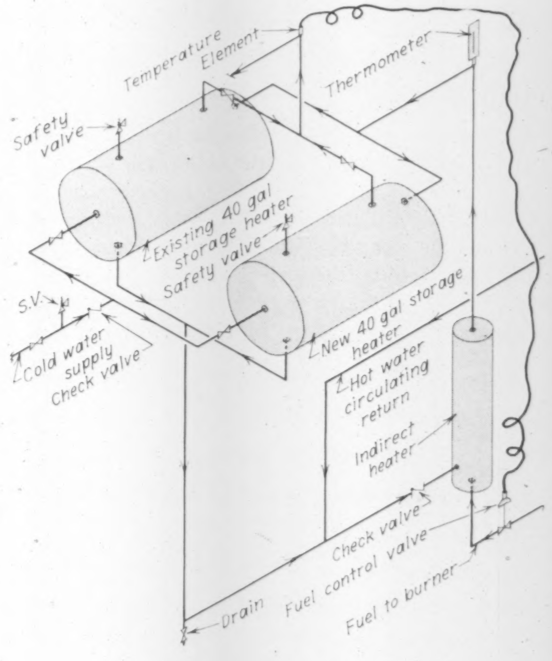
THE REPLIES to the question *How Should Piping Be Connected Between Two Hot Water Storage Tanks?"* are all commendable, especially that of Sheldon R. Higgins, in the June HPAC. In reference to Mr. Higgins' reply I would like to add a 1¼ in. equalizing line between the two tanks so as to obtain equal temperatures. The line should be installed at approximately midheight of the tanks.

Another important point is to pipe the tanks so that the paths the water will flow to each tank from the heater will have the same friction drop. The same applies to the return lines from the tanks to the heater.

Also, to prevent the hot water circulating return from backing into the tanks, check valves should be installed in the return line from the tanks and in the circulating return line.

SOL SCHWARTZ
Professional Engineer
Bellmore, N. Y.

THE AUTHOR'S REPLY—Mr. Schwartz' suggestion to arrange the piping for equal friction drop is good and, although it was not specifically mentioned, it was intended as shown by Fig. 3, which is repeated here.



His suggestion of putting check valves in the return line from the tanks and in the circulating return line is good. This could be accomplished in my arrangement by adding a check valve in the circulating return line and then connecting the circulating return line into the return line from the tanks downstream of the check valve shown in the return line from the tanks. This would make the connection of the circulating return line tie into the return line from the tanks between the check valve shown in Fig. 3 and the heater.

A separate equalizing line should not be necessary if the lines are arranged for equal friction drop, since the tanks are connected with the supply near the top at one end and the return at the bottom near the opposite end, with the supply to the fixtures off the top of both tanks connected with one line in the center to the fixtures. Of course, care must be taken to insure that the lines are adequately sized for the load.

Sheldon R. Higgins
Mechanical Engineer
Long Beach, Calif.

Pressurized Firing: Its Pros and Cons

Much comment has been received from readers of the article* Pressurized Firing: When, Where, How Do We Use It?, *by Robert W. Pixler, in the October HPAC. Here are the remarks of a few. What's your opinion?

Fan Location, Smaller Gas Volume Prime Features of Forced Draft Firing

Reading the article, *Pressurized Firing: When, Where, How Do We Use It?*, by Robert W. Pixler, in the October HPAC, leads me to compare the relative attributes of forced draft and induced draft firing.

Actually, there is little difference in combustion results and efficiency between the two. But there are certain mechanical advantages to forced draft and one of these is that the fan is located immediately adjoining the burner and a simple mechanical linkage permits holding the air-oil ratio constant through all ranges of firing.

In the case of induced draft, the fan is located on the breeching, remote from the boiler, too far for direct mechanical linkage. Therefore, a damper must be placed in the inlet air duct at the burner, and this does not give the same effective control as when the air volume is controlled by vanes at the fan inlet.

Too, a fan on the ground is more readily accessible for maintenance than a fan on top of the boiler.

Another advantage is that a forced draft fan handles a smaller gas volume, and so is smaller and uses a smaller motor than an induced draft for the same boiler output.

Finally, since forced draft implies a tightly sealed unit, there is less opportunity for oil seepage from the boiler firebox, as may be the case with natural or induced draft settings.

Kalman Steiner
Central Fuel Co.
Baltimore, Md.

Like Combination Chimney-Draft Fan, But Selection Depends on Conditions

This is not a field in which I have considerable experience, but for the type of building which I have been called upon to design heating systems I have usually preferred the combination of a natural chimney supplemented by an induced draft fan to insure a satisfactory and uniform draft.

I do not like to have the firebox under a pressure, as is necessary with any system of firing where all the air is forced into the burner under pressure.

The selection of the type of air feed depends so much on the special conditions that I do not believe any definite rule can be made.

Where conditions prohibit a suitable chimney, or for portable units, the pressurized system seems to be necessary. However, for more conventional uses a system of either natural draft or preferably a combination of natural and induced draft is desirable, in my opinion.

Lee P. Hynes
Mechanical Engineer
Haddonfield, N. J.

Possibility of Mechanical Leaks Makes Boiler Room Attendance Big Factor

We feel a factor of prime consideration which should be emphasized is the amount of boiler room attendance available. As Mr. Pixler points out, should any mechanical leaks develop in the boiler setting, breeching, or stack, dangerous and obnoxious flue gases could quickly fill the boiler room and other parts of the building. Where constant attendance is not required by local code or law, serious damage to life and property could occur before the leak is discovered. Thus, the use of pressurized boilers, particularly in heating plants of public buildings such as schools, apartments, commercial buildings, etc., creates a safety hazard.

Mr. Pixler also points out that the use of forced draft firing in most cases accomplishes the same results that are achieved with pressurized firing. However, I believe that with the use of a draft inducer the stack height can be reduced to just clear the building, thus lowering capital costs as well as improving appearance.

Furthermore, this safe type of firing permits the use of standard, conservatively rated boilers, which can accommodate any change in fuel.

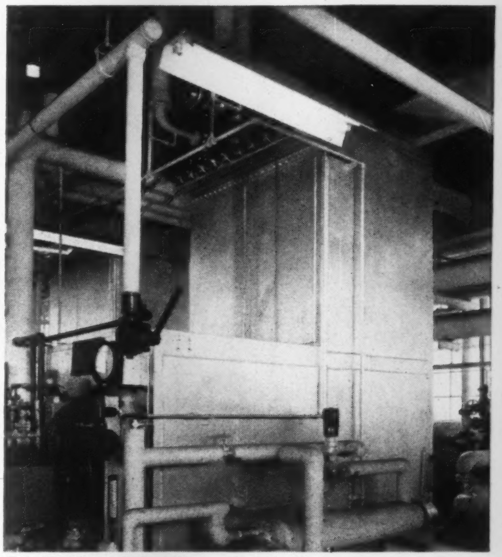
George G. Nash
L. J. Wing Mfg. Co.
Div. of Aero Supply Mfg. Co. Inc.
Linden, N. J.

The Cross Company specifies . . .

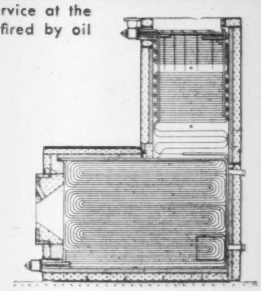
High temperature water by C-E for heating economy ...low maintenance

The Cross Company, pioneer producer of automation machinery, has recently completed an ultra-modern plant in Fraser, Michigan — practically doubling its former production capacity. After a thorough study of heating requirements . . . and with a view toward further expansion . . . two C-E LaMont Controlled Circulation Hot Water Boilers were specified for the new plant. According to Mr. W. P. Reece, Plant Engineer, "the study indicated that this system would provide the lowest fuel and maintenance costs . . . Experience during this winter confirms the soundness of our decision."

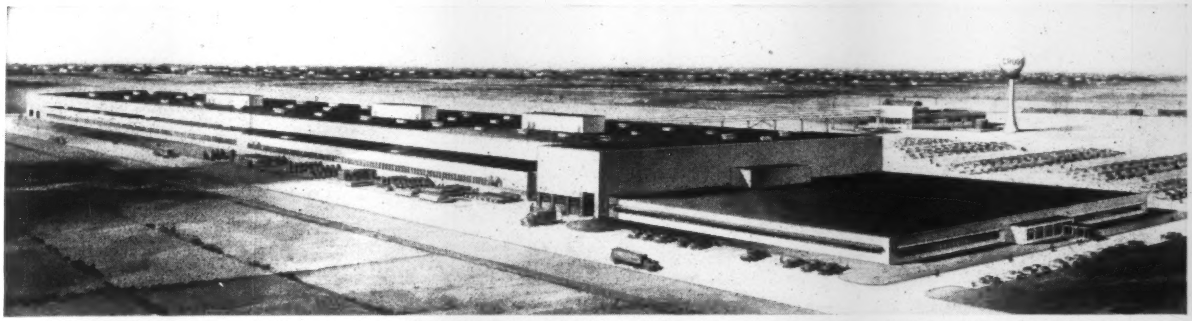
If you are in the market for a heating or process system, it will pay you, too, to investigate high temperature water. Individual needs vary, of course, and both hot water and steam boilers have their place. Our engineers will be pleased to discuss the subject with you or your consultants. Write for our catalog HCC-2.



C E HT Water Boilers in service at the Cross Company. They are fired by oil or natural gas.



Right — One of the 12 million Btu/hr Cross Company boilers. C-E HT Water Boilers are available in sizes from 10- to 300 million Btu per hour; pressures to 500 psi and temperatures to 470F.



Architect's drawing of the new Cross Company plant, Giffels and Vallet, Detroit, Consulting Engineers; Owen S. Lieberg, Associated Consultant.

THESE ARE THE GENERAL ADVANTAGES OF HIGH TEMPERATURE WATER:

1. Higher available heat — many times that of steam at the same pressure.
2. Closer control of temperature.
3. Lower heat loss . . . unused heat returns to the boiler . . . no condensate return lines.
4. No elaborate feedwater treatment . . . make-up requirements are exceptionally low.
5. Steam traps not required . . . trap problems and expense are eliminated.
6. No blowdown losses . . . no safety valve vent losses . . . no condensate losses.

THESE ARE THE SPECIFIC ADVANTAGES OF THE C-E "HT" WATER BOILER:

1. Complete control over circulation in both system and boiler.
2. No separate boiler pump is required, since low pressure loss is inherent.
3. Pressurized operation with oil or gas means no induced draft fan.
4. Single-pass design — no baffles — means cleaner boiler and lower draft loss.
5. Controlled, positive circulation permits more efficient arrangement of heating surfaces.
6. Any fuel — oil, gas, coal, or any combination of fuels.
7. Gastight, welded, steel casing.
8. Fewer headers, all of which are easily accessible.

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ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

Question of the Month

At What Rate Should Steam Lines Be Heated to Avoid Damage?

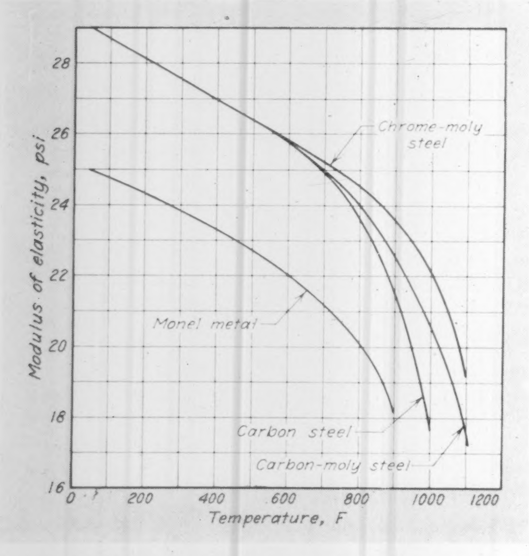
This question was asked previously in HPAC and is repeated here along with answers that have been received from readers. Other answers or comments for publication are invited.

> *"At what rate should long, large diameter steam lines be warmed up in order to avoid excessive pipe stresses and possible damage to the pipe?*
>
> *"For instance, I have a 24 in. diameter Schedule 80 pipe 100 ft long with steam entering the pipe at 750 psi and at 720 F. At what rate should this steam be admitted into the pipe?"—C.V.*

Piping Composition, Other Factors Govern Elasticity, Stress Levels

As IS WELL KNOWN, the modulus of elasticity of most metals decreases at elevated temperatures. Similarly, allowable working stress levels are also less with temperature rise. The exact values of these variables are influenced by composition of the pipe material, such as described by ASTM and AISI specification numbers or alloy content.

In accord with the boiler and piping codes, carbon steel pipe may be employed for 720 F steam temperature. Since the identity of the material is not given by C. V., the latter will be assumed. When passing 720 F steam, carbon steel has a modulus of elasticity (Young's modulus) of approximately 21.5 × 10^6 psi compared with 29 × 10^6 psi at 70 F. It should be noted the rate of change of moduli of elasticity with respect to temperature is greatest with carbon steels and least with austenitic steels. Fig. 1 is a plot of moduli of elasticity for different materials at various temperatures.



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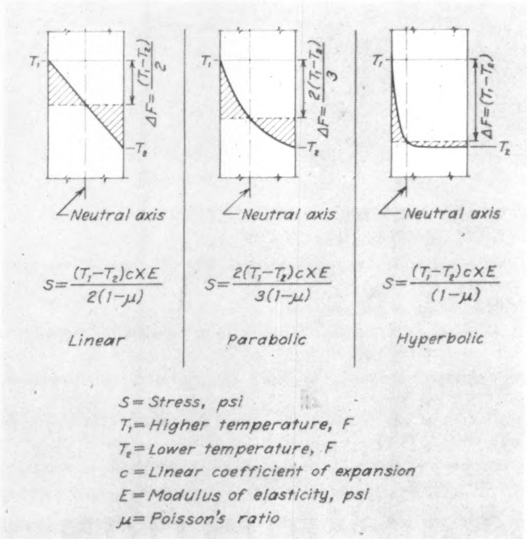
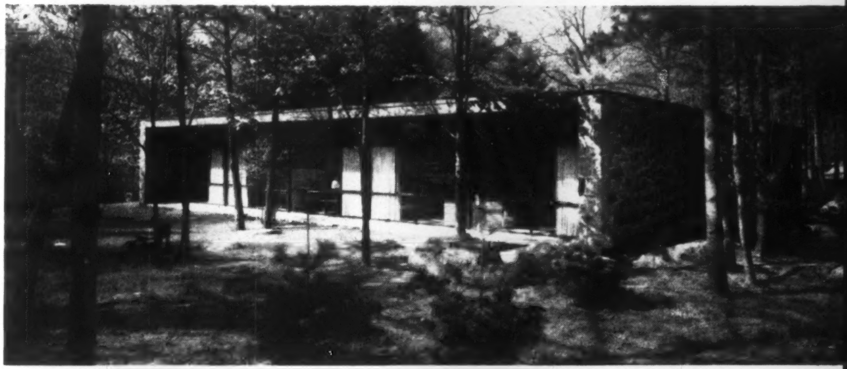

T_1
T_2
$\Delta F=\frac{(T_1-T_2)}{2}$
Neutral axis
$S=\frac{(T_1-T_2)c\times E}{2(1-\mu)}$
Linear
T_1
T_2
$\Delta F=\frac{2(T_1-T_2)}{3}$
Neutral axis
$S=\frac{2(T_1-T_2)c\times E}{3(1-\mu)}$
Parabolic
T_1
T_2
$\Delta F=(T_1-T_2)$
Neutral axis
$S=\frac{(T_1-T_2)c\times E}{(1-\mu)}$
Hyperbolic
S = Stress, psi
T_1 = Higher temperature, F
T_2 = Lower temperature, F
c = Linear coefficient of expansion
E = Modulus of elasticity, psi
μ = Poisson's ratio

2 STRESS RELATIONS for three modes of heat flow show that minimum stress results with linear heat distribution, while maximum values accompany hyperbolic flow

H. B. Smith Boilers Selected for
Two Custom-Quality Luxury Houses



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▲ Architect Eliot Noyes of New Canaan, Connecticut, designed his own home which is radiant-heated. A No. 200-W-5 H. B. Smith boiler handles both heating and hot water supply. Heating Contractor was the Bouton Company of New Canaan.

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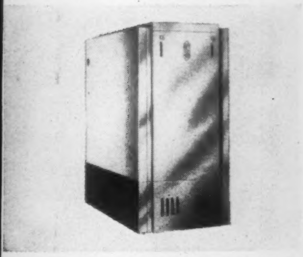

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Many reasons contribute to the fact that H. B. Smith boilers offer most to the custom-designed larger home.

The interesting application of multiple levels, extensive use of glass, and areas above overhangs together with other modern architectural techniques — *all* present heating problems.

Zoned circulated hot water heating is the best answer to winter-long draftless comfort, and today's H. B. Smith boilers are particularly well qualified to provide this solution. These custom-quality boilers incorporate all the features the architect requires for structures such as the homes shown above. Their fast, thorough heat absorption and low draft loss mean amazing fuel economy and compatibility with modern low chimneys.

The high-capacity, built-in tankless water heaters of H. B. Smith boilers offer a continuous supply of *fresh* hot water for several bathrooms, home laundries, dishwashers and other water-consuming appliances.

H.B. Smith CAST IRON BOILERS

H. B. SMITH CO., INC., WESTFIELD, MASSACHUSETTS • *Established 1853*

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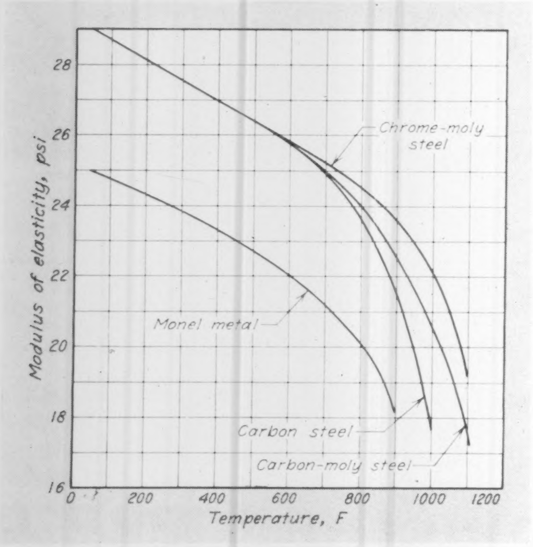

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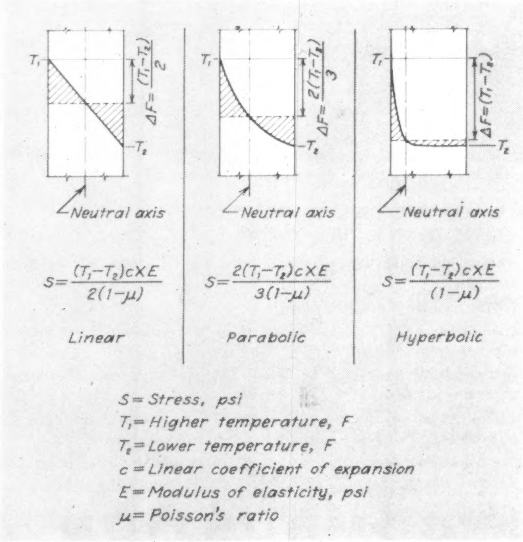
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S=(T₁−T₂)cXE/2(1−μ)
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Linear
Parabolic
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S=Stress, psi
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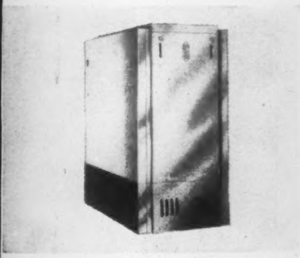

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H.B. Smith CAST IRON BOILERS

H. B. SMITH CO., INC., WESTFIELD, MASSACHUSETTS • *Established 1853*

(*Continued from page* 108)

Discontinuities in the piping system — such as offsets, branches, and change of pipe size — influence heat distribution, which will induce unequal temperature changes. The larger diameter pipe, having greater mass, will require more time to reach equilibrium temperature as compared to that needed for smaller size piping. If adequate provision is made to permit pipe expansion, stress concentrations resulting from unequal heating rates will be minimized, which will not impose limitations on steam admission rates.

Of particular importance during startup are size and geometry of equipment and other components served by the piping. C. V. does not mention the service for which the steam is used. Steam at 750 psi and 720 F suggests power generation employing a turbine. Because of differing dimensions and varying configuration of valves, flanges, steam chest, and turbine casing as well as small clearance between rotor and shell, the turbine manufacturer will specify recommended temperature rise rates. Usually, the latter are criteria for establishing steam admission flow rates in piping systems subject to transient conditions as occurring during startup periods.

Fig. 2 shows typical relations of temperature distribution encountered by boilers, turbines, heaters, and other steam using equipment.

Linear temperature distribution occurs with flat surfaces such as plates and with cylindrical shapes having uniform wall thickness.

Parabolic heat flow is obtained with surfaces having irregular wall thickness such as valves, composite materials of construction such as dual metal construction, and for components having thermal insulation on the cold side such as may be applied to piping and valves.

A hyperbolic heat flow path results when a surface is subjected to a very rapid temperature change as may occur in the high pressure stages of a turbine.

H. B. Wayne
Consulting Engineer
Woodhaven, N. Y.

Need Good Condensation Drainage; Keep Within Safe Thermal Gradients

The rate at which a steam line can be heated without distress depends upon several factors associated with the removal of condensation and keeping within safe thermal gradients.

In the first place, steam should not be fed in faster than condensation is cleared from the line. If condensation is allowed to accumulate, there will be severe pulsations. The line will tend to buckle, also, due to being cold on the bottom and hot on top.

Flanged lines are more sensitive than welded ones, because any condensation lying on the bottom of a flanged joint in a steam line is apt to cause a leak. For good condensate drainage, the line must be pitched enough toward the drainage points to give downhill flow after allowing for the sag between hangers. Consideration needs be given to the number and location of drainage points and to the size of drain connections and trap capacities.

Assuming that adequate drainage exists, the next consideration is the thermal gradient between the inside and outside of the pipe. Severe stresses can be set up by temperature differences across the pipe wall if the inside is heated too much faster than heat can be transmitted through the metal to the outside surface. Generally speaking, it is not advisable to let metal temperatures at adjacent points vary more than 100 F.

Another consideration is to avoid expanding the pipe line lengthwise faster than the hangers can readjust themselves from the cold to the hot positions. If the line is anchored every 100 ft or so, and adequate drainage is provided, it should be possible to heat an insulated line without distress at the rate of 100 F in 5 to 10 min.

A bare pipe might take more time. Flanged joints need to be favored more than welded joints.

A common example of piping subject to frequent heating cycles at about this rate, but not over so wide a range, is an automatically fired steam heating system for a building. Many of these systems are set to cycle every hour.

While there might tend to be a more appreciable buildup of temperature gradients or expansive movements with a superheated steam line for higher pressures, experience with the quick starting of turbines indicates that steam temperatures may be increased at a rate as fast as 500 F per hr over the range from 300 to 800 F. Apparently this causes no distress in the piping, although special precautions are generally taken with the turbine in the way of preheating the bolts of its steam chest.

Sabin Crocker
Mechanical Engineer
Ebasco Services, Inc.
New York, N. Y.

READER ASKS —

"What's Best Method for Joining High Velocity Ducts?"

"What methods have proved to be the most successful for joining high pressure ducts? Ducts are galvanized steel and are spiral welded. Fittings are to be shop fabricated from 20 gage galvanized sheet metal. Static pressures will be from 6 to 9 in. WG.

"Is brazing the best method? If so, what brazing procedure may be used to prevent damage to the galvanizing?"—H. H.

• *YOU ARE INVITED to contribute a question for publication or an answer to a published question. Write: The Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

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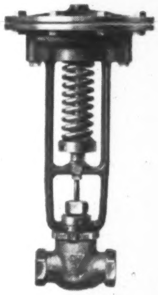
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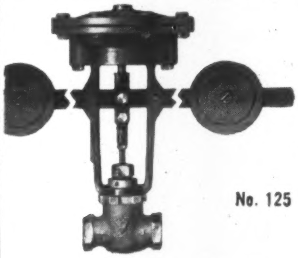
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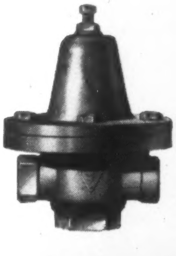
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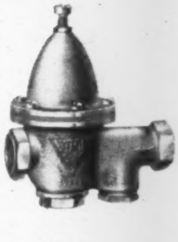
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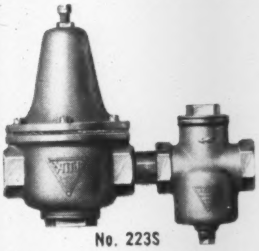
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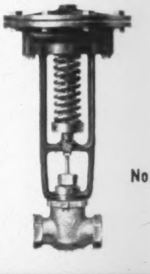
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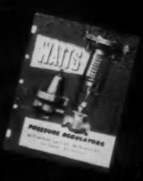
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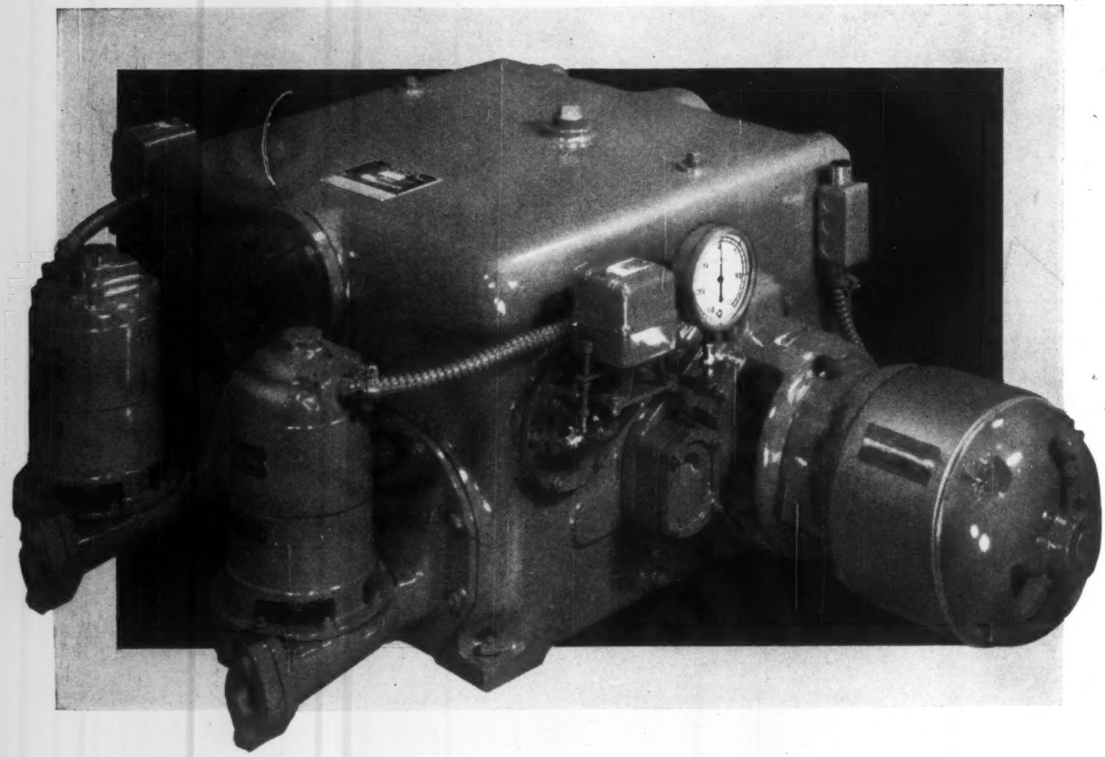
THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



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These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- ✓ **Increased air capacity induces rapid system response without wasteful overheating.**
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- ✓ **Control system that operates individual pumps only when needed.**
- ✓ **Flexibility permitting addition of radiation without changing basic pump installation.**
- ✓ **Low, low, return line connection.**

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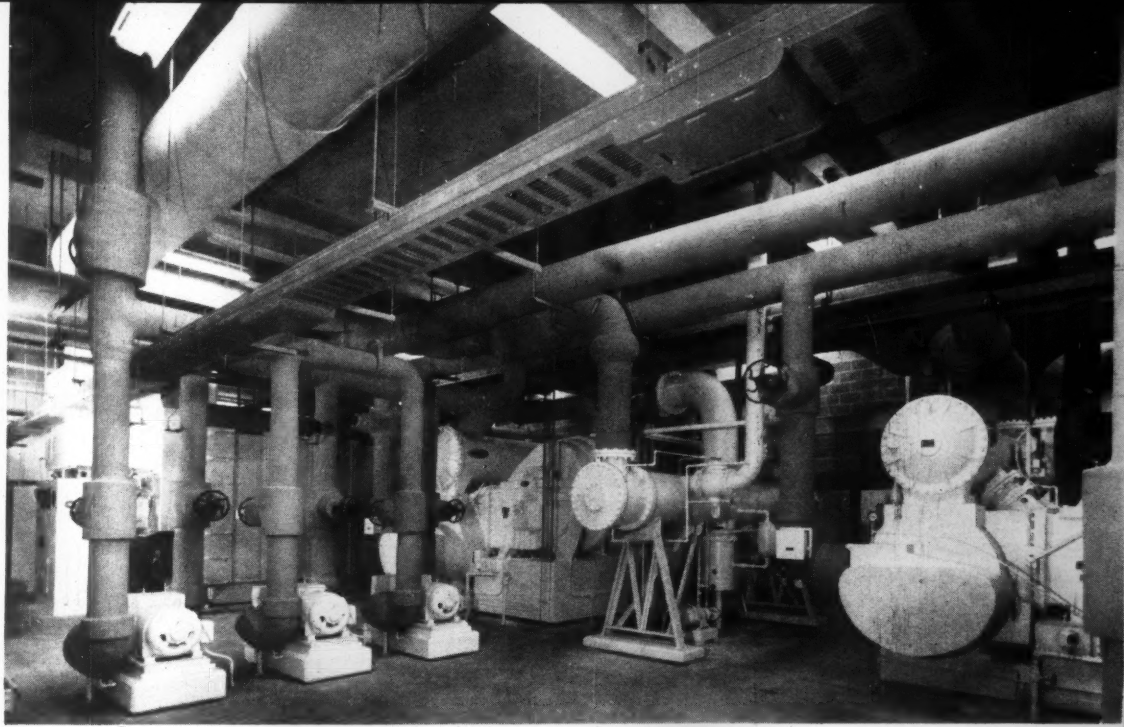
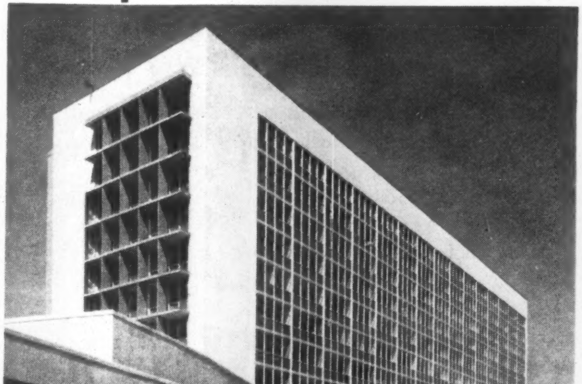


TWO CENTRIFUGAL COMPRESSORS driven by steam turbines comprise 1500 ton air conditioning installation

Here's How Steam Powers Air Conditioning

. . . *in new city hall*

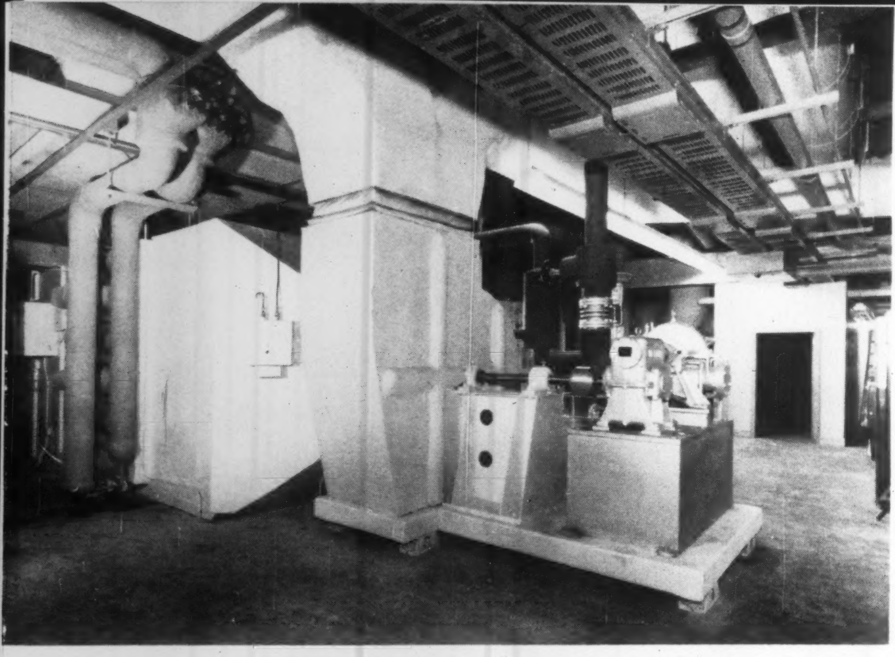


BY WARREN G. MOSES
de Laureal & Moses
Consulting Engineers

Dominating the $20 million group of five major buildings which make up the New Orleans civic center is the 11 story, $7 million City Hall, with 350,000 sq ft of air conditioned office space.

The five block site, formerly a slum area, has four other buildings in addition to the City Hall — Louisiana Supreme Court building, Louisiana State office building, the New Orleans main public library, and a Civil Courts building.

The central, 320 by 76 ft, 11 story tower of the City Hall has three smaller wings. On the west side is a



SMALL TURBINES drive fans on two large primary air units, one outside air unit. Turbines receive 225 psig steam from two gas fired boilers

200 by 120 ft parking garage, which will accommodate 386 cars on three covered levels, and a roof. On the east, a 127 by 105 ft theater-like wing with curved walls and a sloping floor houses the 350 seat council chamber. A third two story wing on the north side houses offices and is arranged to align with the State office building.

Select Gas Fired System

Prior to installing the air conditioning, initial rate studies indicated the economy of a gas fired system, so steam is used wherever feasible.

The system consists of a 1500 ton refrigeration installation containing two steam turbine driven centrifugal compressors, one of 500 and one of 1000 ton capacity, located on the 10th floor. These turbines receive 225 psig steam from two gas fired, forced draft, integral furnace type boilers located adjacent to them.

Steam from this boiler plant also serves heat exchangers throughout the area for hot water heating and provides steam to three small turbines driving fans on the two large primary air units and the outside air unit. These smaller auxiliaries serve as pressure reducing valves and provide low pressure steam for feed water heating. Natural gas at 12 psig is supplied to the burners.

Also located on the 10th floor, in a space enclosed by the framework of the building but actually outside in an unroofed area exposed to the weather, is a six cell induced draft redwood cooling tower. Condenser water pumps are adjacent to the tower, but in the equipment room.

A 10th floor central control room located by a glass partition adjacent to the elevator lobby provides a central operating point for all mechanical and electrical systems throughout the building.

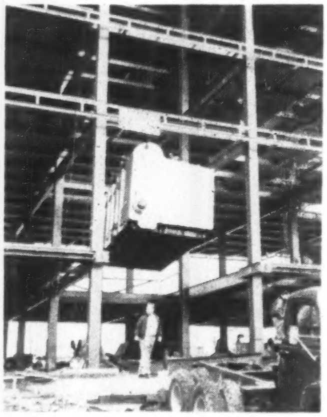
The rooftop location for the air conditioning equipment is extremely desirable as it eases the problems of adequate ventilation, air, noise, heat, and permits a minimum of excavation, due to reduced ceiling height requirements.

The air distribution from the basement up through the 10th floor of the tower portion of the building has its outside perimeter served by two high velocity induction type systems equipped with electrostatic filters on the primary units. Each of the two primary air units takes outside air from an opening in the roof and

How Equipment Was Hoisted

One of the problems encountered in locating the machinery on the top floor was, of course, getting the equipment up there. Each boiler weighs 37 tons.

Close cooperation between the steel fabricator and the mechanical contractor resulted in an arrangement to leave out the steel flooring and joists in one bay on each floor. When the remainder of the steel was fully in place the boilers were hoisted singly through the opening thus provided.



INDUCTION UNITS are built into continuous window casing along entire window sill area. One unit is located beneath each window

TWO MAIN AIR DUCTS run down each side of central furred corridor. Sidewall grilles take off at intervals corresponding to building module

serves an entire face of the building with high velocity, high pressure conditioned outside air at approximately 55 F in summer and heated in winter.

This air is distributed vertically downward along each exterior column of the building in a chase that is actually through a cantilevered area outside the building framework.

Horizontal take-offs from the high velocity air risers proceed to induction units built into a continuous window sill casing along the entire window area. One induction unit is located beneath each window in the building. Each of these 1112 units is also served with supply, return, and drain piping for chilled water in summer and hot water in winter.

Zoning is accomplished in that each of the two main faces of the building is similarly served with its own air handling unit and piping system, providing the needed two major temperature control zones.

Each of the induction units is equipped with a thermostatically operated water valve, but where more than one unit is serving a particular area, a single thermostat is arranged to actuate all the units in that area. In the event of a partition change isolating any unit from the thermostat, additional thermostats can be readily installed.

The perimeter system is capable of producing either warm or cool air, or warm or cool water in any combination of temperatures depending upon the automatic selection by the control system.

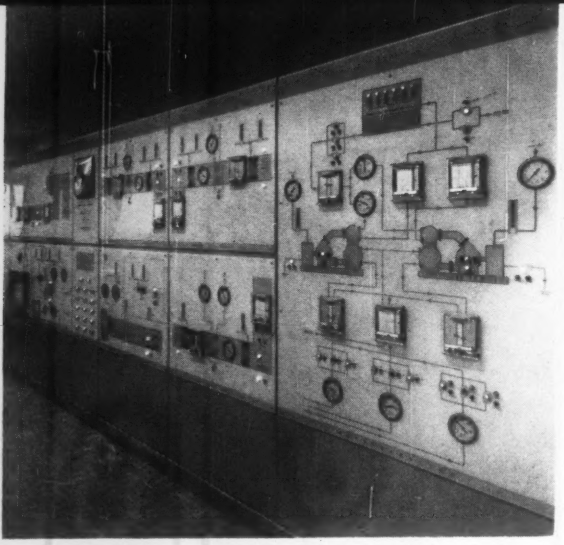
The modular design allowed a major part of the secondary system to be prefabricated and preinsulated in the contractor's shop on a mockup. Over 66,000 copper joints were sweated and insulated in this way.

The two story, lower floor section on the north end extending towards the State office building has a similar perimeter system with a primary air unit located in the basement. It has a single electric motor driven fan on the primary air unit. Control is similar to that of the tower portion. Electrostatic filters are used.

2 Air Units Serve Interior Zones

The interior zones of the tower portion are served by two central air units, or coil chambers, on each floor. Each unit contains filters, cooling coils, and controls.

Air is distributed through two main ducts running down each side of the central furred corridor with sidewall grilles taken off at intervals



CONTROL PANEL enables operator to observe 120 operational points in system. Entire system is controlled, operated, adjusted from this location

corresponding to the building module to avoid any possible conflict with partitions. Air returns through high grilles into the corridor and through the corridors back to the units.

Outside air is delivered to the two equipment locations on each floor by the steam turbine driven fan which operates another primary air unit. This is a high velocity, high pressure outside air unit, taking its outside air from the roof. It is also provided with an electrostatic filter.

This air is distributed at high velocity and pressure to each of the equipment rooms containing the interior zone units, where it is reduced in pressure and velocity through air valves and introduced into the interior zone air system. This outside air is already cooled, filtered, and tempered at its 10th floor source.

Where special zones occur, such as assembly rooms or special offices, additional small central air units provided with cooling and heating coils permit individual temperature control for each specific instance.

The building main entrance, completely glass, has a separate radiant heating panel in the floor slab. This is controlled solely by outside temperature.

Separate Unit Serves Chamber

The council chamber is supplied with air conditioning from a built-up coil chamber in the basement of the main building, supplying air through underground concrete ducts to metal risers serving ceiling outlets in the area over the chamber ceiling. Return air is taken back through another concrete duct under the floor to the unit. Control of this unit is by hot water reheat, after air has been treated by an automatic oil bath filter and passed through dehumidifying coils.

Although attached to the central chilled and hot water supply of the building, the operation of the council chamber unit is completely independent of the rest of the building.

In all systems, 75,000 cfm of outside air is constantly introduced into the building. All toilet and machine areas are ventilated and exhausted. A separate all electric reverse cycle air conditioning system completely isolated from the remainder of the building serves the central fire alarm station located on the 10th floor.

System Centrally Controlled

A feature of the air conditioning system of this building is that it is completely controlled, operated, and adjusted from a single location on the 10th floor. A 20 ft long, color coded, completely diagrammed, and labeled graphic control panel contains pushbuttons, pilot lights, and a complete indexed numbering system. The panel enables the operator at this station to observe temperatures of all major rooms, temperatures of water and air supplied to and leaving from the various heating and cooling coils, operation of each of the major air units and of many of the interior air units, and permits him to remotely start and stop equipment throughout the building. Operation of each piece of equipment is indicated by illumination of pilot lights on the graphic control panel.

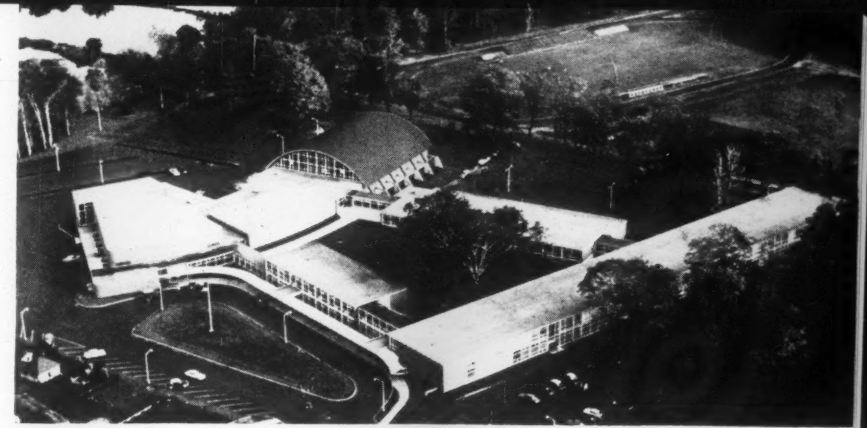
A maintenance telephone system originating at this panel, with outlets in each equipment room and each area where equipment is located, allows close contact with maintenance personnel.

The performance of any 20 of the 120 operational points connected to the electronic resistance thermometer system may be recorded on strip charts by simply shifting jacks in the central keyboard.

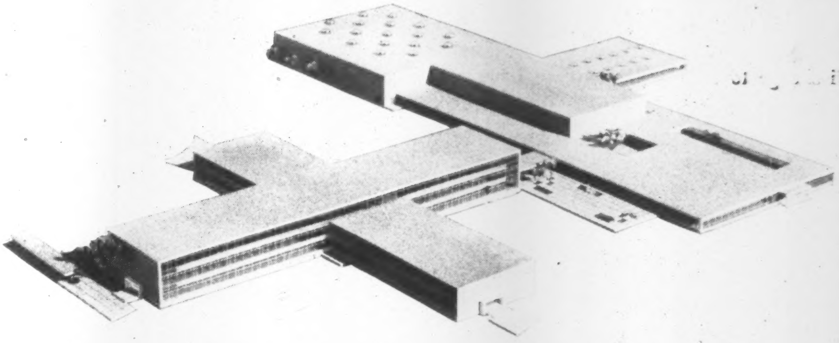
The entire control system is pneumatic and is so arranged that, regardless of partition changes in the building, automatic control may be retained with relatively little changing of the thermostat locations.

A single, dry type unit electrical substation on the 10th floor provides 480 volt, three phase, three wire delta service for all motors used for air conditioning. All of the air conditioning motor starters are grouped together in one motor control center located adjacent to the unit substation.

The building architects were Favrot, Reed, Mathes and Bergman and Goldstein, Parham and Labouisse. The general contractor was R. P. Farnsworth Co. Emile Babst Co. was air conditioning contractor. ‡



EAST HARTFORD school's indirect fired steam heating system has distribution lines laid out in loop to supply various building units. Direct firing would have required several independent heater rooms



NEWER CONARD school is heated, ventilated by two separate direct fired systems. Direct firing is better suited here since school buildings are more compact

Compare Two School Heating Systems

Here's how heating and ventilation was provided for two high schools in the same locale. One school's system is indirect fired, the other has two direct fired systems. How both operate and some of the installation problems encountered are discussed.

BY EVERT M. JOHNSON
Marchant & Minges
Consulting Engineers

TWO OF THE LARGEST HIGH SCHOOLS built in Connecticut since World War II employ air systems for heating and ventilating. One of the systems is indirect fired, and the other is direct fired.

The indirect fired air system is installed in the new East Hartford high school and has been in operation for three full winters.

This school utilizes a steam heating system, the distribution lines for which are laid out in central pipe tunnels in the form of a loop supplying the various building units. A series of double duct systems utilizes eight major fan rooms, with some of the fan rooms containing several air systems each. Each fan system consists of a supply fan discharging air to a steam coil which is controlled from "hot" duct temperature being reset automatically by outdoor temperature.

A return air fan discharges air through an exhaust louver to the outside or recirculates the air to the supply fan, which makes up the exhausted air through an outdoor air intake louver. The exhaust, recirculated air, and outdoor air dampers are controlled from a thermostat in the supply fan discharge, modulating the amount of outdoor air as the outdoor temperature changes. This thermostat is usually set between 55 and 60 F and is the control for the cold duct temperature.

The hot and cold air supply ducts in the building are above the corridor ceilings. Zone takeoffs through mixing dampers are in the dropped ceiling spaces, and the

BOILER PLANT at East Hartford school consists of two 250 hp, one 100 hp steam generators. All are connected to common header so smaller unit can be used for light heating loads in addition to handling domestic hot water

discharge to each room zone is through a high sidewall diffuser on the corridor side of the rooms. Access to the mixing dampers is provided through a "lift out" type of acoustical ceiling construction.

Return air in the classrooms is taken from a continuous grille along the window stool which is approximately 6 in. from the floor. From this point the air passes through the openings of a precast hollow floor system to a return header constructed below the corridor floor.

The boiler plant consists of two 250 hp and one 100 hp steam generators. The latter is designed for the domestic hot water load. The three boilers are connected to a common header so that the small boiler can be used for light heating loads in addition to handling the domestic hot water. The boilers are fired with No. 6 oil, with electric preheating.

Use Two Separate Direct Fired Systems

The heating and ventilating system for the newer Frederick U. Conard school in West Hartford consists of two separate direct fired systems, which also burn No. 6 oil, with electric preheating.

One system is in the basement in the center of the classroom multistory wing; the other is on the second floor above the music department in the auditorium-gymnasium building. Each building is heated by two direct fired cast iron furnaces under one casing.

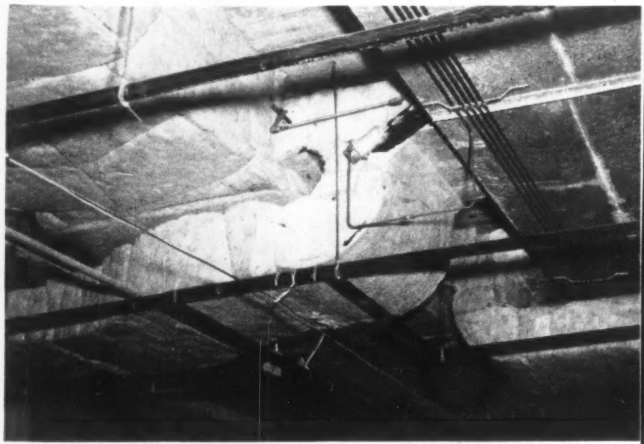
Two supply fans are provided with each system, and there are no return air fans. The mixing dampers for these systems are at the heater room rather than in the furred ceiling spaces. In the classroom building, which is three and two stories in height, a modified double duct system is used, with the hot duct rising directly from the top of the furnace up in a three story shaft. The cold duct is wrapped around the hot duct, and the remainder of the shaft forms a return air plenum. The mixing is accomplished at each floor in this shaft, with individual ducts to each zone.

TABLE 1—EQUIPMENT CAPACITIES are compared here for the two schools

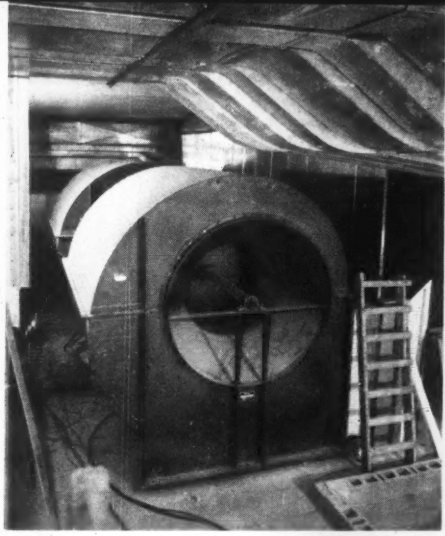
	East Hartford (indirect fired)	Frederick U. Conard (direct fired)
Building area, sq ft	188,000	229,000
Total cfm of supply air	110,000	209,000
Total heating input from furnaces or boilers, Btu per hr	13,000,000	11,000,000

The air supply to each classroom in this school is through a high sidewall diffuser on the corridor side of the room. The return air for each room is on the corridor side at the floor. The return air is brought from the grille to the corridor ceiling space on the floor below, which is used as a return air plenum. Return air from the first floor is in a concrete plenum below the first floor corridor.

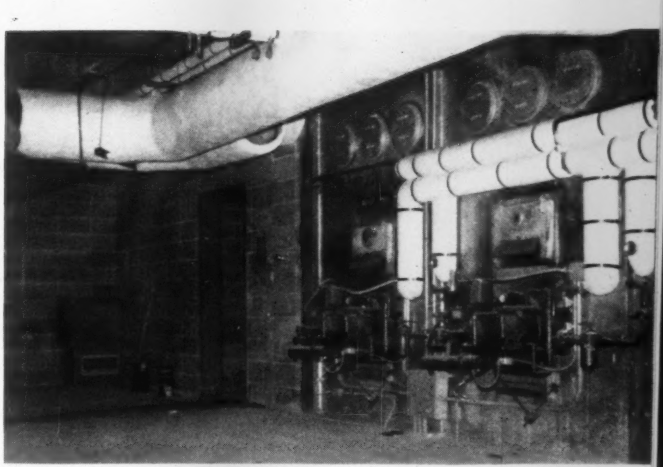
The return air and outdoor air dampers are modulated to provide 55 to 60 F air at the fan discharge for cold or bypass temperature control. Hot duct or bonnet temperature is controlled in the classroom building by an averaging controller, a patented device furnished by the furnace manufacturer. In the auditorium-gymnasium



HOT, COLD AIR SUPPLY DUCTS in East Hartford school, shown during construction, are above corridor ceilings. Ducts discharge to room zones via high sidewall diffusers



TWO SUPPLY AIR FANS are provided for each of two separate direct fired systems serving Conard school. Systems use no return air fans



EACH HEATER ROOM in Conard school has two direct fired cast iron furnaces under one casing. Systems burn No. 6 oil, with electric preheating

building, the oil burners are controlled by end switches on representative mixing dampers.

The installed equipment capacities of the two systems are compared in Table 1.

The installed fan capacity for the East Hartford school is approximately 0.6 cfm per sq ft of building floor area: and in the Conard school fan capacity is approximately 0.9 cfm per sq ft. One reason for this difference is that the East Hartford school has direct radiation in corridors, toilet rooms, and storage rooms. The major portion of the difference, however, is due to the fact that the Conard school system was designed on a lower discharge air temperature.

The installed heating capacity for the East Hartford school is 69 Btu per hr per sq ft of building area, while the Conard school is 18 Btu per hr per sq ft. The reason for this is that the boilers for the East Hartford school were chosen on the basis of each boiler carrying two-thirds of the total load.

Two problems were encountered on the East Hartford school, in which an attempt was made to correct the situations on the Conard school. Too much dependence was placed on the air system for cooling in hot weather on the East Hartford school. Too few ventilating sash areas were installed, and not enough attention was exercised to provide sun control, especially on the south side of the buildings. The East Hartford school has since provided aluminum awnings on some of the south exposures in order to cut down overheating due to sun load.

The air systems can do an excellent job of providing cooling when the outside temperature is below 60 F. The best that the system can do with outside temperature above 60 F is to provide the full amount of outside air at whatever temperature it happens to be at the time.

The Conard school was provided with generous operating sash areas. It was recommended during the design stage that exterior sun shading of some sort be included. This was rejected but an alternate bid was taken for solar retarding glass on the south and west exposures. This alternate was not accepted by the owner in spite of warnings by the engineers.

The architect was Nichols & Butterfield. The heating contractors were Thomas G. Shaffer, Inc. (East Hartford) and Atlas Sheet Metal, Inc. (Conard). ‡

Air Condition Public Sidewalk

. . . temporary scheme may become permanent installation

THE WORLD'S first public sidewalk air conditioning installation was unveiled recently in Kokomo, Ind., according to Carrier Corp. It was part of a citywide sales promotion to dramatize air conditioned summer shopping.

The climate controlled outdoor area is an 18 ft wide stretch of walk extending almost half the length of the city's largest department store. A selfcontained unit spilled cool dehumidified air just over the heads of window shoppers.

In preparation, polyethylene film was laid over a wood framework. The roof of the tunnel like structure was covered with aluminum panels.

When the promotion came to an end, the air conditioned sidewalk was dismantled. But the department store is considering the possibility of making such an installation on a permanent basis. ‡

Where to Put a 1000 Ton Air Conditioning System

. . . in a multistory existing office building with limited space for equipment

Here's how it was done in the Koppers Bldg.—the largest installation ever made at one time in an existing building in Pittsburgh. Discussed are several important factors that influenced the choice of a high velocity perimeter induction system supplemented by a low velocity interior system.

BY CHARLES E. CLAIN
Peter F. Loftus Corp.
Design and Consulting Engineers

THE 33 STORY Koppers Bldg., headquarters for Koppers Co., Inc., is being furnished with a year 'round air conditioning system. The total cooling capacity of the system is the largest single installation ever made, at one time, in an existing building in the Pittsburgh area.

Important factors in the air conditioning design were:

1) Minimum space required for equipment rooms in the main areas of the building.

2) Ease of obtaining individual control to suit each tenant's preferences.

3) The ease with which the cooling units could be concealed and blended into the decor of the interior.

4) The simplicity of alterations required to meet future space requirements due to changes in space usage.

5) Elimination of large ducts in the main business areas.

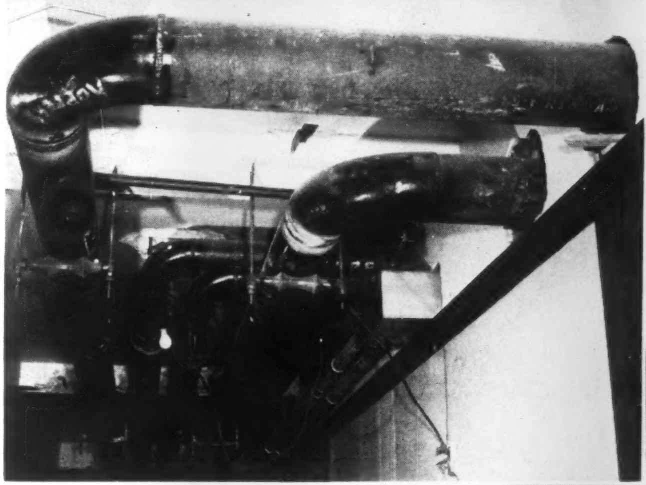
6) The major part of the work could be done with minimum interference with normal business activities of the tenants during normal business hours.

The Koppers building is built of masonry and steel construction, an office building with setbacks on the 21st and 29th floors. It occupies about one-third of a large block.

This structure, on three main streets, with entrances off each, is approximately 196 ft by 92 ft wide. The steel frame divides the building into bays approximately 18 ft by 16 ft in size, with two windows in the outer bay walls, except at the rear. The average distance between floors is about 12 ft, but the head room under the structural beams is less than 10 ft, except for the first and 33rd floors. It contains approximately 289,000 sq ft of office space, with offices divided in sizes ranging from half a bay to those using a whole floor.

The first floor layout has the main entrance centrally located, behind which is the three story high rotunda which forms a T-shaped public area, with entrances at each end, and with the elevator lobby at its rear. The remainder of the space is divided into several stores. The next two floors, with the same general layout and with balconies overlooking the rotunda, are divided into offices. Above the third floor, the building consists of offices as noted above.

The first basement is occupied almost entirely by a restaurant. The two subbasements contain mechanical equipment and storage space.



AIR DISTRIBUTION DUCTS, secondary water mains are located above false ceilings. Shown above is system during installation. At right, ceiling has been added

This building receives little shading from adjacent buildings until the late afternoon. It is fortunate that the wall with the maximum sun load, facing south-southwest, is almost free of windows due to the bank of 14 elevators which serve the building.

Major Problem Was Finding Equipment Space

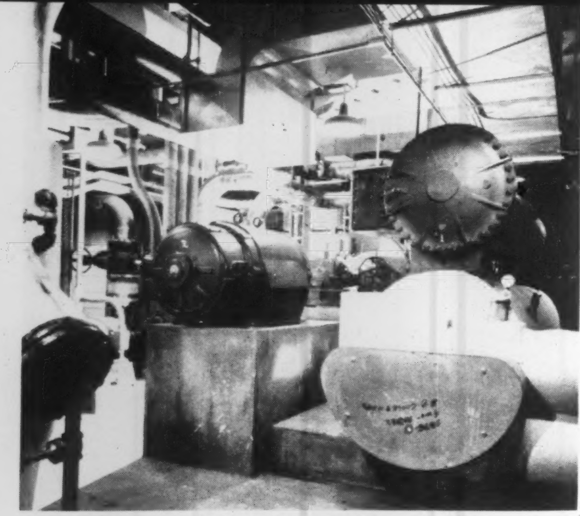
The major problem which had to be solved for this installation was finding sufficient space within the structure to house the various pieces of equipment required. Our first big problem was solved when the building management agreed to remove one of the elevators and use the vacated space for the main pipe shaft. In fact, management limited us in our planning at only two points: no alterations to the appearance of the rotunda or peaked copper roof, and keeping all equipment rooms as small as possible.

A careful study of preliminary layouts made of the various spaces available for installing the main refrigeration components, two 500 ton centrifugal water chillers, circulating water pumps, and necessary auxiliaries in the three basements, showed that the only logical location for them was in the restaurant storeroom and personnel dressing rooms under the loading dock at the first basement level. This space had many points to recommend it, beside the fact that no extensive revision of existing building equipment and piping would be required, and that space to serve its present functions was available elsewhere.

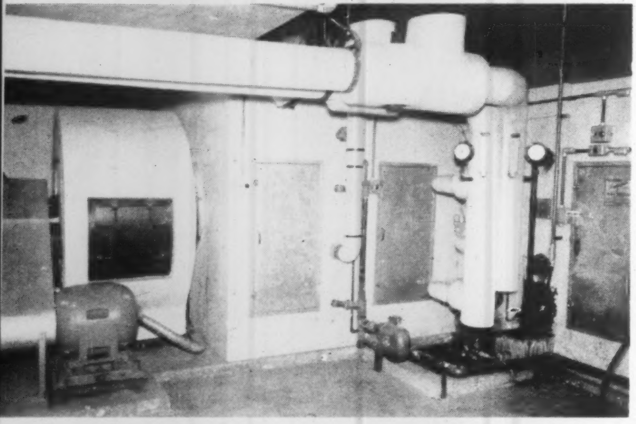
Its main advantage was the ease with which the large pieces of equipment could be moved into the building from the street, through an access opening cut into the loading dock floor. Only a single wall separates this space from the elevator shaft now used as the pipe shaft, and it opens on the freight elevator. The power transformer vaults serving the building were at one end of this space. The only fault was the low headroom under the loading dock entryway, causing some piping difficulties.

The main equipment room houses the two 500 hp centrifugal compressors connected in series, complete with evaporator, condenser, compressor, gear box and motor, the 1560 gpm at 100 ft head condenser pump, the 125 gpm at 140 ft head auxiliary condenser water pump, and the 1860 gpm at 125 ft head primary water pump and necessary piping. It also contains the necessary starting and control equipment with the two resistor banks required for capacity control of the compressors.

Due to headroom limitations and other factors, three primary air handling apparatuses are required for the 73,700 cfm dehumidified air for the perimeter units. Two of these apparatuses are on the 10th floor, serving the east and west sides of the building, respectively, supplying air to the round, high velocity, branch supply ducts to all units between the second and twentieth floors. The secondary water supply pump and main heat exchanger



ONE-HALF of main refrigerating components are located in basement. Installation required no extensive revision of building equipment, piping



ONE OF THREE air handling apparatuses is located on 21st floor. Also shown are housings for preheat and reheat coils, dehumidifiers, spray pumps, electrostatic filters

are also between the two apparatuses on this floor. The third apparatus is on the 21st floor and serves the entire perimeter of the building, through round supply ducts to all units up to the 32nd floor.

The primary apparatus rooms each contain the following pieces of equipment, each housed in an airtight enclosure:

1) Primary air fan: airfoil backward inclined blower, supplying 26,000 cfm at 9 in. static pressure, belt driven by a 50 hp motor. Another fan is used on the 21st floor.

2) Steam preheat and reheat coils.

3) Spray coil dehumidifiers with their chilled water coils and spray pumps.

4) Electrostatic air filters.

The above equipment delivers 100 percent outside air, cooled to 48 F, reaching the farthest unit with an 8 F temperature rise. The outside air is obtained from weatherproof louvers mounted in the existing windows of this area, through ductwork. The conditioned air is discharged to the sound absorbing chambers before being distributed throughout the building.

The main primary air distribution ducts and secondary water mains are at the ceiling on these floors. Rectangular ductwork was used for these ducts because of the limited headroom. The riser shafts for the smaller round ducts and water piping branches required to distribute the primary air and secondary water to each perimeter unit throughout the building are between the two windows in each bay. Individual pipe and duct takeoffs are made at each floor for the two units served on each floor by each riser. After the water piping and ductwork has been thoroughly checked for leaks, they will be enclosed within a false pilaster, which will match the existing building column pilasters.

The secondary chilled water supply mains are on the 10th floor, and supply branches lead this water to all perimeter units. The return main is on the 21st floor, collecting the water from the second floor up and the 32nd floor down, and returning it to the 10th floor for re-use as required.

Cooling Tower Installed in Recreation Room

The water cooling tower location presented many problems. If the tower were placed on the loading dock roof, as first planned, the exhaust air might enter the adjacent buildings through open windows. Ductwork could be erected to discharge the exhaust air above their roof tops, but it would be unsightly and would become a future maintenance headache.

The best location for the cooling tower would have been at the top of the building, with a standard vertical discharge tower. Unfortunately, this installation would have required a major change in the peaked copper roof.

The cooling tower is in the old recreation room on the 32nd floor. This space is divided into two rooms; the cooling tower room and office space. The tower room is about 54 ft long by 32 ft wide and 22½ ft high, with six large windows which are now the outdoor air inlets. The exhaust fans, four axial flow fans, are mounted across the room from the air intakes in the outer wall between elevator banks and above the electrical switchgear, which could not be relocated. This location places the exhaust fans on the center of the tower, and not spaced uniformly across the face of the tower, possibly requiring baffles to produce an even flow of air across the tower.

The cooling tower is a specially designed horizontal flow tower which fits across the length of the room. The tower is supported on raised steel support beams, attached to the existing building steel, with necessary clearance above for proper maintenance. This raised mounting was used to provide the best air distribution possible through the tower. The open space above and below the tower is sealed off with partitions.

The four exhaust fans are mounted in the space available for them in a two high, two wide pattern. Each fan is a 66 in. diam axial flow fan handling 69.250 cfm at 1.75 in. static pressure. and direct driven by a 30 hp. 860 rpm motor.

To prevent damage to the lower floors of the building and the existing switchgear. the tower room was completely sealed off from the rest of the building and the area given a waterproof coating. The floors were enclosed by concrete curbs at doorways, and new partitions and the entire area treated as a roof, being covered with a heavy waterproof membrane, properly flashed at the outer edges and sealed at the seams and new floor drains, forming a shallow basin. The floor drains are connected into the existing building waste lines, while the main tower drain and overflow lines are spilt on the adjacent roof. near existing roof drains.

Round Duct Supplies 1400 Induction Units

One of the 1400 perimeter induction air conditioning units is installed under each window in the space formerly occupied by the old metal sills and enclosures housing the removed cast iron radiators. Each unit receives primary air through a round, flexible duct connected to the air supply riser. and its sensible heat coil is connected to the secondary water risers through copper tubing and the control valve.

The induction units are concealed behind cabinets constructed of non-warping pressed wood, with a wood-grained plastic material finish, providing an easily cleaned and maintained finish. A supply grille in the top and a removable front panel, for maintenance access, are the only breaks in the finished surface. These new enclosures harmonize with the existing wood trim of the existing cabinet work.

Each induction unit is individually controlled by a selfcontained automatic modulating valve. The control bulb for sensing the space temperature is mounted across the face of the sensible heat coil. The room occupant can adjust the room temperature by setting the manual selection dial on the valve as desired. This dial is reached through an access door at one end of the supply grille.

The individual perimeter units vary in cooling capacity from 3000 to 7500 Btu per hr. The largest unit is rated at 1700 Btu per hr for primary air at 56 F, and 5800 Btu per hr from the secondary coil with 55 F entering water. The same unit is rated at 11,000 Btu per hr heating capacity with 130 F water with fan operating, and 6300 Btu per hr heating capacity under gravity operation.

The interior zone air handling units were installed in the ex-elevator shaft because of limited space elsewhere. This provided a room, within the newly erected fireproof partitions separating it from the operating shafts, 8 ft, 8 in. long by 8 ft, 3 in. wide.

The piping occupies 2 ft, 6 in. of the room length. Into this space are the two 12 in. condenser water lines, two 10 in. primary water lines. and one 8 in. steam supply line up to the 10th floor. Above this floor, the space is occupied by two 12 in. condenser water lines, two 6 in. primary water lines, and one 10 in. secondary water line, and a 3 in. steam supply line. The primary cooling water line continues up the shaft to the last interior zone unit, the condenser water line runs up to the tower on the 32nd floor. and the secondary water lines and steam line end at the 21st floor. The condensate is returned to the basement through some of the existing radiator return lines.

Two corrugated. bellows type. expansion joints are used on the steam supply line. The steam lines are anchored at the 12th and 22nd floors. the secondary water line is anchored at the 16th floor. and the primary water main is anchored at the 12th floor. All lines from the basement are supported at their lower ends with pipe columns welded to the lowest elbows and anchored to the floor by mounting flanges. The secondary water branches are anchored and equipped with expansion joints.

Interior Zone Units Serve One to Five Floors

The interior zone air handling units, serving one to five floors, are the standard upright type consisting of a fan section, coil section with chilled water coil, base with drip pan, filter box, and mixing box with dampers. The filter box is above the unit and connected by ductwork to the unit inlet. The space temperature is controlled by a return air thermostat setting the mixing dampers through the modulating damper motor. The return air is removed from the hallways through return air grilles. which have balancing dampers where more than one floor is served by one unit. The outdoor air comes from weatherproof louvers mounted in the outer wall of these rooms. The return air grilles and outdoor air inlets are connected to the mixing box by ductwork.

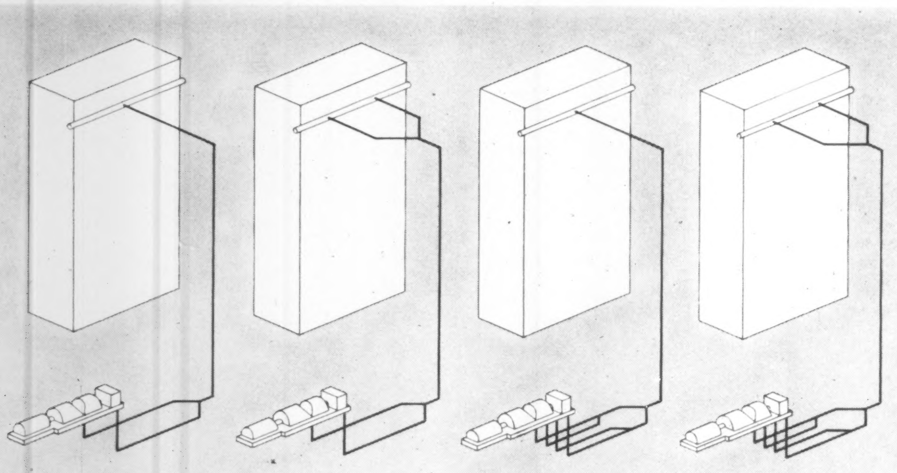
The basement restaurant and lobby are conditioned by new fan coil units installed in the existing ventilating systems. These coils are supplied with primary chilled water directly from the chillers.

The stores on the first floor, and some of the offices on the second floor, were formerly air conditioned with package air conditioners with water cooled condensers and their own duct systems. These units were replaced with new units of the same type, but their condensers obtain cooling water from the main condenser cooling water circuit through a separate system with its own pump.

The moisture condensed on the cooling coils in the various pieces of air conditioning equipment is drained to the building waste lines through safe wastes, usually a service sink on the floor below the unit or in the basement. If a service sink was unavailable, a safe waste connection was made at the unit before connecting to the waste lines.

The main primary and secondary water lines, condenser water lines, and steam mains are of welded fabrication of steel pipe and fittings. Secondary water risers, drain lines, and connections to individual cooling coils are made with copper pipe, fittings, and valves soldered together. ‡

Photos courtesy Chicago Blower Corp.



	Three Branch System	Four Branch System	Five Branch System	Six Branch System
Number of simultaneous equations to be solved	12 Equations 12 Unknowns	18 Equations 18 Unknowns	24 Equations 24 Unknowns	30 Equations 30 Unknowns
Hours necessary for solution-				
1. Desk calculator or slide rule	80	160	240	320
2. Digital computer				
Setting up time	4	5	6	8
Actual machine time	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{5}{8}$	1
Total	$4\frac{1}{2}$	$5\frac{2}{3}$	$6\frac{5}{8}$	9

5 FOUR MAIN STEAM PIPING SYSTEMS with the required number of corresponding simultaneous equations necessary for solution are compared here for solution times, using a digital computer and desk calculator or slide rule

How to Use Digital Computers To Calculate Piping Flexibility

BY TOR KOLFLAT and K. E. KNAPP
Sargent & Lundy, Engineers

THE FOLLOWING information is obtained from a complete flexibility calculation:

- Pipe stress.
- Forces and moments acting on equipment.
- Pipe movements for hanger design.
- Point of minimum moment for cold springing.

1. *Pipe stress.* Piping systems are subject to a variety of loadings which create different stresses. Generally, only the following more significant loadings need be considered in piping stress analysis:

a) Pressure, internal or external.

b) Weight of pipe, including fittings, valves, contained fluid, insulation, wind and other external loadings.

c) Thermal expansion of the line.

The first two loadings produce sustained nonthermal stresses which are readily evaluated.

Thermal expansion stresses tend to relax as a result of local flow or "creep." The stress reduction which results because of "creep" will manifest itself as a stress of reversed sign in the cold condition. Although the hot stress tends to diminish with time, the sum of hot and cold stresses during any one cycle is constant and is designated as the "stress range."

The 1956 edition of the American Standard Code for Pressure Piping specifies the formulas to be used in calculating the allowable stress range and the expansion stresses in a piping system.

This is a second article adapted from a paper presented by the authors at the recent American Power Conference in Chicago. The first article appears in the August HPAC.

The physical factors affecting piping flexibility in central station piping systems and how recent trends have amplified these factors were outlined in the August HPAC. Here the authors discuss what flexibility calculations determine, and describe the computer procedure using an adaptation of the general analytical method.

One of the prime reasons for making a complete flexibility analysis is to be able to check the pipe expansion stress against the piping code allowable stress range.

2. *Forces and moments acting on equipment.* A flexibility calculation determines the magnitude and direction of forces and moments acting on attached equipment due to the thermal expansion of the connecting pipe. The various turbine and boiler manufacturers offer unique and different arrangements of connections to superheat and reheat steam piping, and each installation must be analyzed individually to insure that the tolerable limits of reactions that the attached equipment can satisfactorily sustain are not exceeded.

3. *Pipe movements for hanger design.* Further information obtained from a piping flexibility calculation is the movement of the piping system when going from a hot to cold condition. Pipe movements are necessary for design of the hangers which support the pipe. Knowledge of these movements also makes it possible to locate the "neutral point" — zero movement — in the system where a rigid safety hanger may be installed.

4. *Point of minimum moment for cold springing.* Although the piping code does not recognize any benefit in stress reduction by cold springing the pipe, due to the concept of "stress range," the net forces and moments exerted on attached equipment can be appreciably reduced by judicious cold springing. The most desirable point in a piping system for cold springing is a point of minimum moment. A flexibility calculation will indicate the location of minimum moment.

A list of various acceptable methods of calculating stresses would include:

1) General analytical method.
2) Elastic center method.
3) Karelitz - Marchant method.
4) Algebraic method.
5) Grapho - analytical method.

General Analytical Method Easily Adapted

The general analytical method is very favorably adaptable to digital computers and is presently used in the authors' firm. In order to fully appreciate the use of digital computers in piping flexibility calculations, a brief review of the general analytical method is necessary.

The piping system is divided into members and branches. Each straight and curved section in the system is called a member and is assigned to one of three — *x, y, z* — working planes. For each member there are a total of 21 "shape coefficients" that must be calculated. (There are actually 25 shape coefficients but four have a minor influence and are neglected).

Shape coefficients are a function of the location, geometry, line moment, and products of inertia of each member, and an average of four separate arithmetical operations is necessary to determine the 21 shape coefficients of each member. Piping systems analyzed may have as many as 40 members. Once all of these shape coefficients have been calculated, they are combined in a prescribed routine to obtain the constant coefficients that are used in the simultaneous linear equations.

The next step is the solution of a system of simultaneous linear equations in which the summed shape coefficients become the coefficients of the unknown forces and moments, while the known terminal displacements, elastic constants, and moments of inertia are represented in constant terms. The number of simultaneous equations to be solved and the numbers of unknown to be found conform with the number of indeterminate loads on the piping structure. Each fully fixed load point results in six indeterminate loads (forces in each of three directions and moments around each of three axes).

Solution of the above simultaneous equations yields the moments and forces imposed on the system by each load point but acting at the arbitrarily selected origin of the coordinate axes, *x, y,* and *z*. It is necessary to transfer these moments and forces to points in the system at which the stresses and movements are desired.

The reason so much time is needed to make a flexibility calculation is because of the great deal of time necessary to calculate these shape coefficients and correctly solve the resulting simultaneous equations.

In the case of a single branch pipe line in space with two end points, the six simultaneous equations with six unknowns — three forces and three moments — necessary for solution would be the following form:

$$K_0F_x + K_1F_y + K_2F_z + K_3M_x + K_4M_y + K_5M_z = EI\,\Delta_x \quad \ldots\ldots\ldots\ldots [2]$$

$$K_6F_x + K_7F_y + K_8F_z + K_9M_x + K_{10}M_y + K_{11}M_z = EI\,\Delta_y \quad \ldots\ldots\ldots\ldots [3]$$

. . . reduces tedious calculation to a matter of hours

$$K_{12}F_x + K_{13}F_y + K_{14}F_z + K_{15}M_x + K_{16}M_y + K_{17}M_z = EI\,\Delta_z \quad \ldots\ldots\ldots\ldots [4]$$

$$K_{18}F_x + K_{19}F_y + K_{20}F_z + K_{21}M_x + K_{22}M_y + K_{23}M_z = EI\,\theta_x \quad \ldots\ldots\ldots\ldots [5]$$

$$K_{24}F_x + K_{25}F_y + K_{26}F_z + K_{27}M_x + K_{28}M_y + K_{29}M_z = EI\,\theta_y \quad \ldots\ldots\ldots\ldots [6]$$

$$K_{30}F_x + K_{31}F_y + K_{32}F_z + K_{33}M_x + K_{34}M_y + K_{35}M_z = EI\,\theta_z \quad \ldots\ldots\ldots\ldots [7]$$

where: F = Forces imposed by load point; M = Moments imposed by load point; E = Modulus of elasticity; I = Moment of inertia; Δ = Movement of load point; θ = Rotation of load point; $x,y,z,$ = Direction in space; and $K_{0\text{-}35}$ = Resultant shape coefficients.

For multibranched systems in space, the number of equations and unknowns is $6(n-1)$ where n is the number of end points. A six branch — six end points — system would require 30 simultaneous equations with 30 unknowns in place of the equations shown above.

Various types of branched systems with the corresponding number of simultaneous equations necessary for solution are shown in Fig. 5. Also shown is a comparison of the time required for solution using a desk calculator and a digital computer.

Three Units Make Up IBM 650 Computer

Prior to 1954, flexibility analyses were performed in the authors' firm with only the aid of a desk calculator. In 1954 with the ever increasing criticalness of flexibility and the large amount of time necessary for solution of multibranched systems, it was decided to utilize a digital computer for piping flexibility calculations.

The computer first employed was an IBM card programmed calculator Model 605 with three storage units. Recently the entire programming solution of the general analytical method was converted from the 605 to the new IBM 650 electronic data processing machine.

The three units that make up the Type 650 machine were shown in Fig. 1, in the previous article, in the August HPAC. They are the read-punch unit, console unit, and power unit. Input and output information is through the read-punch unit. A maximum input rate of 200 and output of 100 cards per minute is possible.

The console unit contains the calculating unit, the control console, and the magnetic drum. Information necessary to process a problem is stored on the magnetic drum. Communication with the machine is possible by means of the control console.

Power supplies for all the machine units is contained in the power unit.

Advantages of Computer Summarized

Use of a digital computer in piping flexibility analysis has reduced a heretofore long, tedious, and repetitious calculation to a matter of hours.

Advantages of digital computers for piping flexibility calculations may be summarized as follows:

1) Reduction in calculation time.

2) Less probability of errors in final results.

3) Possible utilization of personnel relatively inexperienced in the field of piping flexibility.

Computer Solution Procedure Outlined

All information for the solution of a problem is fed into the machine by means of punched cards which can be classified as follows:

- "Instruction cards" contain the step by step procedure to be followed for the solution of a problem. Each card usually contains a maximum of seven instructions which are read and retained on the magnetic drum before any calculating is done.
- "Data cards" are punched for each particular piping system to be analyzed and contain all the pertinent data necessary for the solution, such as pipe size, temperature, length and location of pipe members, and so on. The data from each card is processed in accordance with the instructions already on the magnetic drum before the next card is read.
- "Answer cards" begin as blank cards which are placed in a specific hopper in the read-punch unit of the machine. During the solution of the problem, these cards are punched with the desired answers and neatly stacked to await removal by the operator.

The computer solution procedure for a complete analysis of any piping system can be outlined as follows:

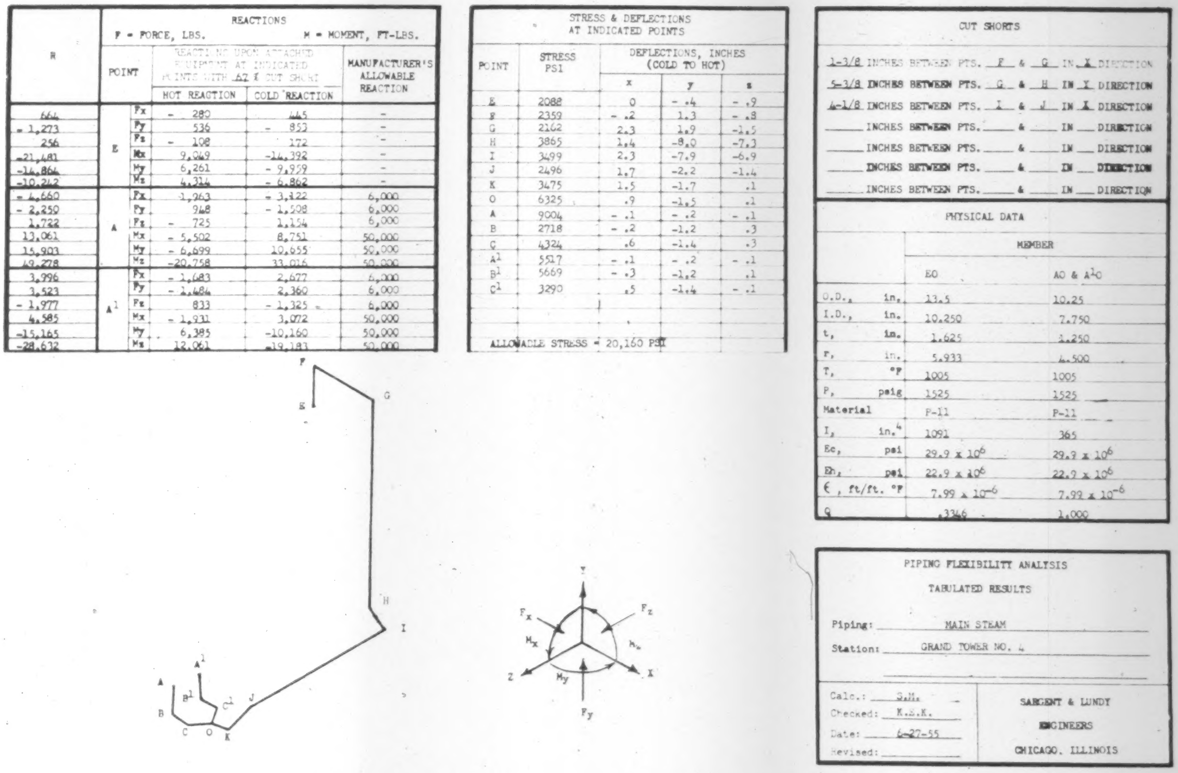
- Setting up the problem.
- Running the machine.
- Interpreting the results.
- Tabulating the results.

1. *Setting up the problem.* The first step in setting up the problem is the drawing of an isometric sketch of the entire piping system superimposed on a three dimensional system of coordinate axes for the purpose of reference orientation. The piping system is divided into members and the points at the ends of the members are numbered in accordance with a prescribed numbering system. This identifying number accompanies the data for that particular point throughout the solution of the problem and likewise accompanies and identifies the final answers pertaining to that point.

After the isometric sketch is drawn and properly labeled, various physical data is tabulated. This data consists of pipe size and wall thickness, temperature, moment of inertia, coefficient of thermal expansion, modulus of elasticity, and other pertinent information. Orientation data obtained from the isometric drawing together with the above physical data, is next key punched on cards.

Four types of data cards necessary for each member that must be punched are:

- Thermal expansion card.


F
E
G
H
I
J
K
O
C
C1
B
B1
A
A1
Y
Fx
Fz
Mx
Mz
Z
X
My
Fy

R	REACTIONS F = FORCE, LBS. M = MOMENT, FT-LBS.				
	POINT		REACTIONS UPON ATTACHED EQUIPMENT AT INDICATED POINTS WITH 67 % CUT SHORT		MANUFACTURER'S ALLOWABLE REACTION
			HOT REACTION	COLD REACTION	
664	E	Fx	- 280	445	-
- 1,273		Fy	536	- 853	-
256		Fz	- 108	172	-
-21,481		Mx	9,049	-14,392	-
-14,864		My	6,261	- 9,959	-
-10,242		Mz	4,314	- 6,862	-
- 4,660	A	Fx	1,963	- 3,122	6,000
- 2,250		Fy	948	- 1,508	6,000
1,722		Fz	- 725	1,154	6,000
13,061		Mx	- 5,502	8,751	50,000
15,903		My	- 6,699	10,655	50,000
49,278		Mz	-20,758	33,016	50,000
3,996	A1	Fx	- 1,683	2,677	6,000
3,523		Fy	- 1,484	2,360	6,000
- 1,977		Fz	833	- 1,325	6,000
4,585		Mx	- 1,931	3,072	50,000
-15,165		My	6,385	-10,160	50,000
-28,632		Mz	12,061	-19,183	50,000

STRESS & DEFLECTIONS AT INDICATED POINTS

POINT	STRESS PSI	DEFLECTIONS, INCHES (COLD TO HOT)		
		x	y	z
E	2088	0	- .4	- .9
F	2359	- .2	1.3	- .8
G	2162	2.3	1.9	-1.5
H	3865	1.4	-8.0	-7.3
I	3499	2.3	-7.9	-6.9
J	2496	1.7	-2.2	-1.4
K	3475	1.5	-1.7	.1
O	6325	.9	-1.5	.1
A	9004	- .1	- .2	- .1
B	2718	- .2	-1.2	.3
C	4324	.6	-1.4	.3
A1	5517	- .1	- .2	- .1
B1	5669	- .3	-1.2	.1
C1	3290	.5	-1.4	- .1

ALLOWABLE STRESS = 20,160 PSI

CUT SHORTS

1-3/8 INCHES BETWEEN PTS. F & G IN X DIRECTION
5-3/8 INCHES BETWEEN PTS. G & H IN Y DIRECTION
4-1/8 INCHES BETWEEN PTS. I & J IN X DIRECTION
______ INCHES BETWEEN PTS. ______ & ______ IN ___ DIRECTION
______ INCHES BETWEEN PTS. ______ & ______ IN ___ DIRECTION
______ INCHES BETWEEN PTS. ______ & ______ IN ___ DIRECTION
______ INCHES BETWEEN PTS. ______ & ______ IN ___ DIRECTION

PHYSICAL DATA

	MEMBER	
	EO	AO & A1O
O.D., in.	13.5	10.25
I.D., in.	10.250	7.750
t, in.	1.625	1.250
r, in.	5.933	4.500
T, °F	1005	1005
P, psig	1525	1525
Material	P-11	P-11
I, in.^{4}	1091	365
Ec, psi	29.9×10^6	29.9×10^6
Eh, psi	22.9×10^6	22.9×10^6
ϵ, ft/ft. °F	7.99×10^{-6}	7.99×10^{-6}
Q	.3346	1.000

PIPING FLEXIBILITY ANALYSIS

TABULATED RESULTS

Piping: MAIN STEAM
Station: GRAND TOWER NO. 4

Calc.: S.M.
Checked: K.S.K.
Date: 6-27-55
Revised: ______

SARGENT & LUNDY
ENGINEERS
CHICAGO, ILLINOIS

6 TYPICAL RESULTS SHEET looks like this after answers printed by the computer have been filled in. This sheet in conjunction with the original isometric drawing represents a finished flexibility analysis

- Shape coefficient card.
- Stress card.
- Deflection card.

When all the pertinent data and information has been punched on the data cards the problem is set up and ready to be run on the machine.

2. *Running the machine.* Ten different decks of instruction cards — approximately 1000 cards — represent the entire solution program. Eight of these decks is the most that will be used in any one solution. The number of branches of the piping system determines which particular series of instruction decks is necessary.

Instruction decks and the data cards are fed to the read-punch unit of the machine in a certain sequence which follows logically the pattern of the initial "setting up." A minimum amount of card handling is required by the operator. This greatly reduces the possibility of human error during the solution. Furthermore, if by some chance the cards are fed to the machine in an improper sequence, certain checks incorporated in the solution will cause the machine to stop and initiate an alarm light.

Only one setting of the controls is necessary at the beginning of the problem. From that point on the calculation is automatic.

3. *Interpreting the results.* As the results are calculated by the machine they are punched on the blank answer cards stored in the hopper of the read-punch unit. From these cards the results are printed by the machine on a large sheet of paper. A method of numerical coding accompanies the printed results and designates the following:

a) Whether the answer is a force, moment, stress, movement, or rotation.

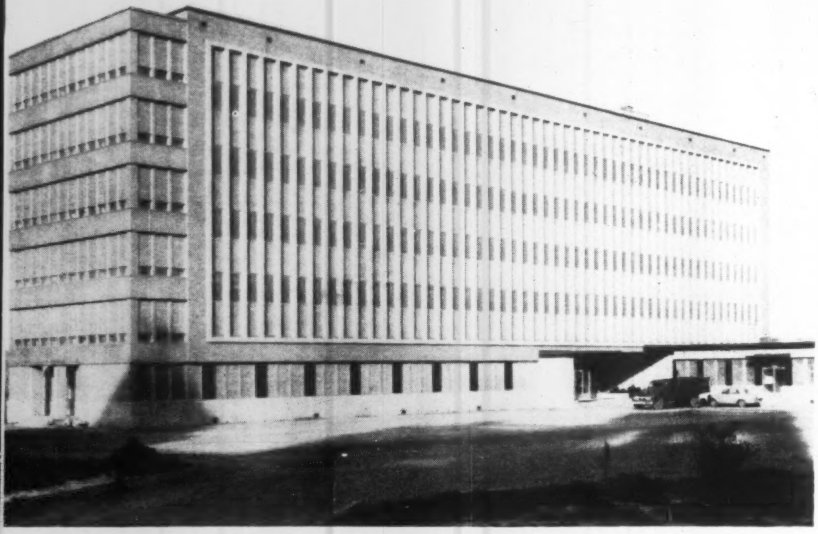
b) Magnitude of answer.

c) Direction and location of answer as referred to the coordinate axis of the isometric drawing used in "setting up" the problem.

Interpretation of the results consists of a routine identification of the particular numerical code numbers printed with the answers.

4. *Tabulating the results.* The final step in the solution is the filling in on a standard results sheet the answers printed by the machine. This results sheet in conjunction with the original isometric drawing represents a finished flexibility analysis. A typical completed results sheet and the information contained thereon is shown in Fig. 6. ∓

The authors wish to thank Mr. L. H. Johnson of the General Electric Co. for his cooperation and exchange of information during the early stages of development, and the mathematical services section of the Armour Research Foundation for the use of both their IBM 605 and IBM 650 during the past three years.



NEW HOSPITAL, eight stories high, is connected by basement tunnel to five story nurses' residence

For convenient regulation of heating and ventilation . . .

Individual Zone Control Panels Serve New $4 Million Hospital

BY J. M. PAQUET
Tasse, Sarault & Associates
Consulting Engineers

As told to Edmund T. Nesbitt

Conveniently located individual zone control panels provide excellent regulation of the "conditioned air" supply in six zones and air exhaust in 14 zones of the new Jeffery Hale's hospital and adjoining nurses' residence in Quebec City. Panels are installed at all nurses' stations, in operating room areas, laundry, kitchen, X-ray department, autopsy room, dining rooms, laboratory, outpatients' department, recovery rooms, and other areas.

The hospital is eight stories high, and the nurses' residence is five stories. The two buildings cost $4 million. They are built of concrete and brick, and are connected by a basement tunnel through which ducts are built into a suspended ceiling, as in corridors of all floors of both buildings. Three more stories can be added to the hospital. The present capacity is 140 beds.

The main air supply and exhaust fans are in a penthouse on the hospital roof. Four main ducts lead from the main plenum chamber through ceilings. Many areas have the air supply heated, filtered, purified, and humidified, as required, according to season or occupancy.

The L-shaped hospital has a subbasement boiler room equipped with two water tube boilers and two steam injection type water heating tanks. A master indicator and control panel in the building superintendent's office overlooking the boiler room shows at a glance which ventilating fans are operating. The panel has controls for all zones of the heating system.

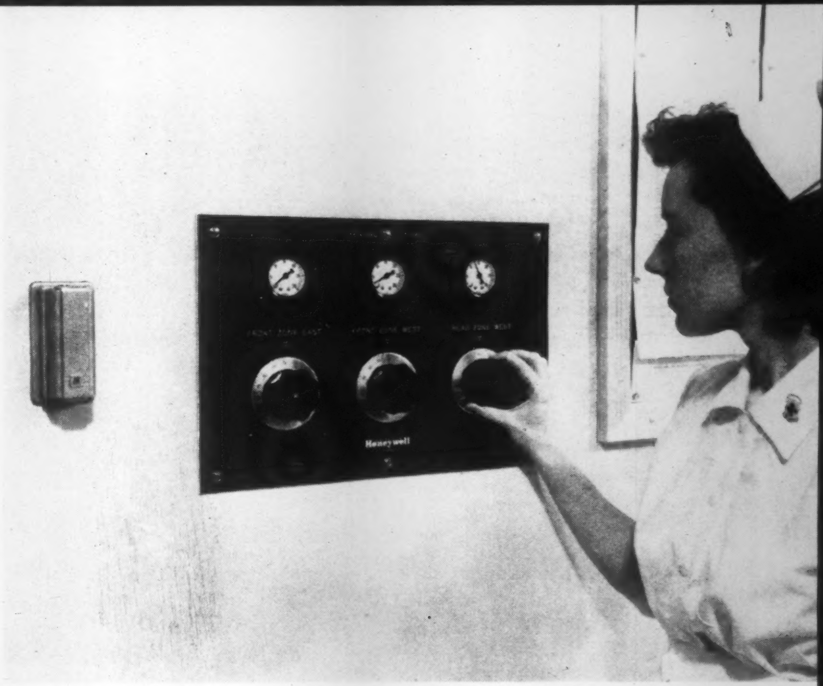
Individual ventilating zone control panels are installed near heating control panels on each floor of the hospital.

The intake for the ventilating system has a single fan, connected to the main plenum chamber by a short duct in the penthouse. Four main air supply systems branch into zones. Recirculating systems are provided for the nursery, a recovery room, the X-ray department, and the outpatients' and drug departments.

All ducts are of galvanized iron. Main ducts at fan outlets are 20 × 12 in., except the large duct supplying air to the main kitchen, which is 30 × 30 in.

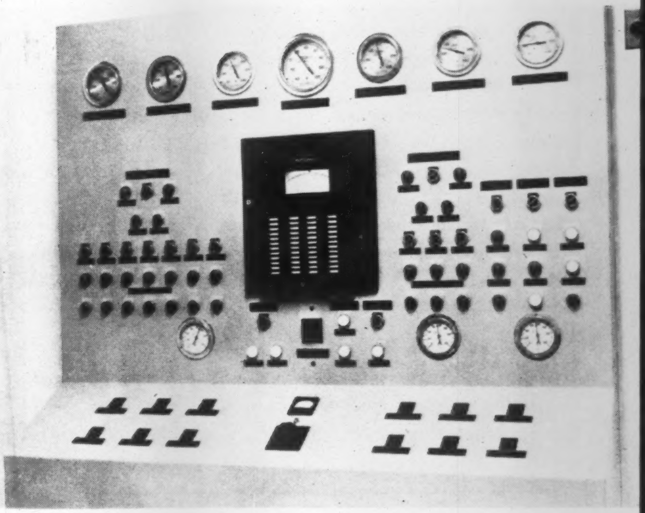
The ventilation system is connected to almost every room in both buildings. Since there are no large public areas, most of the branch ducts are quite small, even where they serve larger rooms such as the main dining room, main kitchen, operating rooms, laundry, and corridors. Hospital bedrooms are almost all private or semiprivate rooms; only a few rooms are four bed size.

(Continued on page 130)

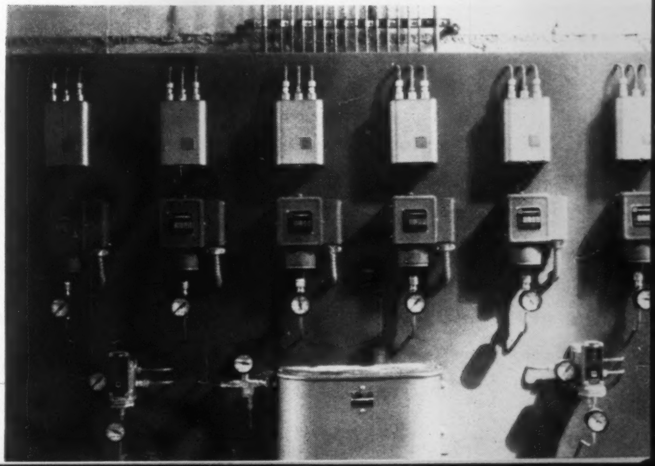


TEMPERATURE ADJUSTMENT for three zones is made at one of five similar heating control panels at nurses' stations on upper floors

MECHANICAL CONFERENCE is held between chief engineer Don Robertson, left, and hospital administrator K. M. Nicholson in latter's office. As chief of maintenance staff, Mr. Robertson controls heating, ventilation, and water supply from panel in his own office overlooking boiler room. Refrigeration, oxygen, and electrical systems have controls in adjoining rooms



MASTER CONTROL AND INDICATOR PANEL in chief engineer's office monitors and controls heating and conditioned air systems



SECONDARY CONTROL PANEL in penthouse has pneumatic controls which automatically regulate ventilation fans

The largest ventilated areas are, in this order, the main kitchen, the dining room, the auditorium-gymnasium, the laboratory, the outpatients' department, the living room in the nurses' residence, the hospital board room, and operating area.

While the suspended ceilings made the installation of ductwork comparatively simple, great care had to be taken to provide adequate insulation because the same ceiling areas contain most of the hot water piping, electric power and lighting cables, drainage pipes, and transit tubes.

Duct maintenance, or later extensions of the ventilating systems, can be effected fairly easily, since many steel panels are removable.

Exhaust vents are provided in canopies over the cooking ranges in the main kitchen and the sheet pressing machine in the laundry, in basement and subbasement respectively, and in the operating rooms on the second floor. Some five of the 16 zones are served by both supply and exhaust systems, including the areas mentioned, and the X-ray and recovery rooms.

How fans, other equipment were designed

The main fans and other equipment in the penthouse were designed to the following specifications:

The outdoor air intake fan is a heavy duty 60 cycle direct propeller fan, with capacity of 5500 cfm, operated by a 1 hp three-phase motor at a maximum speed of 1150 rpm, on 208 volts, with a magnetic starter and on-off switch.

Installed in the intake system are a 6400 cfm electronic air cleaner, with an automatic cleaning timer and valves; a selfwashing air filter unit, having six 4 in. thick type filter panels; an automatic timer to operate hot water wash, controlled by a solenoid valve; a 54 × 18 in. steam coil rated at 20 psig. This coil is installed with a 50 × 21 in. bypass damper.

A. *Supply and Recirculation Systems for the Nursery* have a vertical ventilation unit complete with casing, filters, humidifiers, fan, motor, v-belt drive, belt guard and coils.

This unit, with a capacity of 1225 cfm, is driven by a $\frac{1}{2}$ hp one-phase motor, operating on 208 volts, and having a magnetic starter.

The one row, 12 × 30 in. heating coil has a capacity of 29.3 M Btu per hr when supplied with water entering at 190 F and leaving at 170 F. A filter section is complete with two 20 × 20 × 1 in. self-charging electrostatic type filters.

The humidifier consists of atomizing water spray nozzles complete with strainer.

The system also is equipped with a 24 × 24 in. activated carbon air recovery cell having a maximum capacity of 1000 cfm. This is installed with a manually adjusted bypass damper.

B1. *Supply and Exhaust Systems for the Operating Rooms.* A centrifugal fan with top horizontal discharge, with oil sleeve bearing, having a capacity of 1200 cfm at a static pressure of 0.65 in. water gage, is operated by a $1\frac{1}{2}$ hp, 208 volt motor having a magnetic starter.

A pan type humidifier coil made of 6 ft of 2 in. copper pipe is capable of evaporating 8 gph of water with steam at 20 psig. The humidifier pan, 24 × 18 in., is made of 24 oz copper. An outside float control pan has a copper float and gage glass showing the height of water in the pan.

Also included in the *B*1 system is a booster type hot water heating coil for every room. These coils are one row deep and are supplied with water entering at 190 F and leaving at 170 F.

The exhaust fan in this system is a centrifugal, upblast discharge with oil sleeve bearings, with 1200 cfm at 0.5 in. static pressure WG, and operated by a $\frac{1}{2}$ hp, 208 volt motor with magnetic starter.

Provide Oxygen and Nitrous Oxide Piping to 15 Rooms

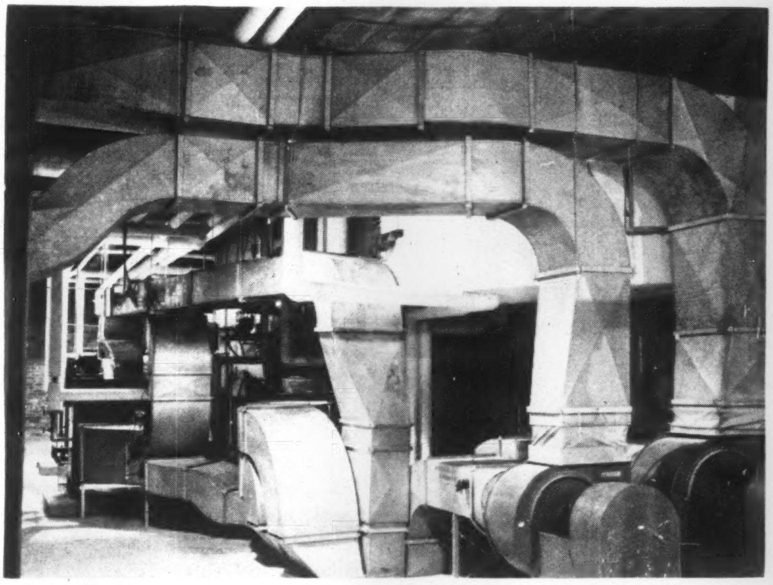
PIPING SYSTEMS for oxygen supply and nitrous oxide gas supply to outlets on several upper floors, including all of the operating room areas, the recovery room, nursery, delivery rooms, fracture room, and emergency rooms, are entirely of copper tubing. Main lines from the subbasement supply room are 1 in. in diameter. Laterals are $\frac{3}{4}$ in., and risers and drops are $\frac{1}{2}$ in. in size.

Hard temper copper tubing, type K, was specified for assembly with solder type fittings. There are some 30 outlets for each of these piping systems. Outlets are 5 ft, 6 in. above the floors.

The fittings are wrought or cast copper, and joints are assembled with brazing alloy. Shutoff valves are diaphragm type. Brass connections and reducing joints are used in some locations, with solder type fittings. Valve connections are threaded.

There is also a vacuum drainage piping system, having practically the same features as the other two, so far as the copper piping and fittings and brass valves are concerned. This system has 31 outlets in 15 rooms, including five outlets in the recovery room. The pump is vented to the roof with a 2 in. pipe from the oxygen supply room. The pump has automatic electrical control.

All three of the copper piping systems were cleared by compressed air and thoroughly tested before being put into service.



AIR INTAKE AND SUPPLY DUCTS in penthouse serve main zones from single intake. Some zones have air supply heated. There is no refrigeration

Aluminum heavy duty automatic shutters were installed in this and all other intakes.

B2. *Supply and Exhaust for Seven Operating Rooms.* This system is identical to the *B*1 system except for the capacity. The fan has a capacity of 2100 cfm and is operated by a ¾ hp motor. The pan type humidifier evaporates 15 gph with steam at 20 psig. A booster hot water heating coil is included, similar to that in *B*1 system. The exhaust fan is a 2100 cfm centrifugal unit operated by a ½ hp motor.

C. *Supply and Exhaust Systems for the Recovery Room* consist of a vertical ventilator unit having a capacity of 520 cfm of standard air against an external static pressure of 0.9 in. WG including filters, operated by a 1/3 hp motor.

The heavy heating coil in this system is 12 × 18 in., one row deep, and is rated at 13.1 M Btu per hr. The filter section has a selfcharging electrostatic filter, and the humidifier is of spray type complete with spray nozzles and strainer.

D. *Supply and Recirculation Systems for X-Ray Dept.* Equipment installed in this system consists of a vertical ventilation unit, with a capacity of 1120 cfm, operated by a ½ hp motor. The heating unit is 12 × 18 in., one row deep, and is rated at 24.4 M Btu per hr.

The filter section has a selfcharging electrostatic filter, 20 × 20 × 1 in. Also, there is spray type humidifier.

E. *Air Intake Supply and Exhaust for the Kitchen.* The outdoor air intake is 42 × 54 in., made of aluminum, and similar to those in the other systems.

A 54 × 30 in. steam coil rated at 20 psig is installed with a 54 × 12 in. bypass motorized louver supplied with controls.

Also installed in this system is a selfwashing air filter unit having six 4 in. thick filter panels similar to the units in the other air intake systems.

The supply system consists of a 6000 cfm centrifugal fan of top horizontal discharge type, operated by a 1½ hp motor.

This and all other fans have vibration isolation pads over the concrete bases.

The exhaust system for the kitchen consists of a 6000 cfm centrifugal fan of top horizontal discharge type, operated by a 1½ hp motor. Maximum outlet velocity is 1200 fpm. This fan is connected directly to the canopy over the electric ranges and soup makers, frying ranges and broiling ovens in the center of the main kitchen. The canopy has four air-grease filter sections, with a total of eight filters, each 9½ × 9½ × 2 in.

Stainless steel ducts in the dishwasher room exhaust steam from the washing machine.

F. *Outpatients' Dept. and Drug Supply Room.* This system includes an 800 cfm horizontal ventilation unit; a 12 × 30 in., one row, hot water heating coil rated at 17.5 M Btu per hr; and a 20 × 20 × 1 in. filter section and a humidifier.

The exhaust and recirculation system in this section includes an 800 cfm centrifugal fan.

G. *The General Ventilation System,* which serves corridors, waiting rooms, and several other areas, is served by a 4100 cfm centrifugal fan operated by a 1½ hp motor.

There is no heating unit and no humidifying unit in the *G* system, nor in other exhaust systems (*H, I, J, K, L*). These serve the morgue, paint shop, laboratory, the diet kitchen, another small area, the laundry, the cooking school classroom in the nurses' residence. Most of these rooms are in the basements. They are heated by radiators, and in summer are cooled by air at natural underground temperature.

M. *The Laundry Exhaust System* consists of two 3500 cfm propeller type fans, operated by ½ hp motors. Control switches are close to the fans. Exhaust vents are fitted with heavy duty aluminum automatic shutters.

N. *The Cooking School Classroom,* or kitchen lab, is served by a 1200 cfm utility fan for exhaust only. This fan is in the penthouse, where a magnetic starter is connected to a pushbutton control station in the kitchen lab. A similar system with a 525 cfm fan serves another basement classroom or lecture room. ⌗

Additional features of this heating and ventilation system will be discussed in an early issue of HPAC.

Package Units Aid Central Plant; Condition 190,000 Sq Ft Offices

Mounted on iron bases, 10 ton units without ducts blow air over 7 ft, 9 in. partitions in large office areas. Three existing fan rooms with outdoor air supply plenums to the spaces were altered to provide an integrated, economical system.

BY C. F. MOWREY
Production Engine Dept. Facilities
Aircraft Gas Turbine Div.
General Electric Co.

Expansion of manufacturing facilities at the General Electric aircraft gas turbine division plant at Evendale, Ohio, meant additional office quarters, including air conditioning in a large well built area which was originally designed for storage purposes.

A variety of problems invited a variety of solutions. The 190,000 sq ft space to be cooled was part of a basement area of about 400,000 sq ft, entirely without duct distribution. All of the air was supplied through outlets along the upper part of the plenums which were in all four walls. The air was exhausted at seven fan rooms in the east half of the area.

Chilled water coils had been installed in banks of 100 sq ft each, at fan rooms Nos. 3, 4, and 5 in order to cool the air by means of chilled water from chillers in an adjacent building. The overall demand on the central plant became so great, however, that the quanity and temperature of the water were not suitable for cooling the area in question.

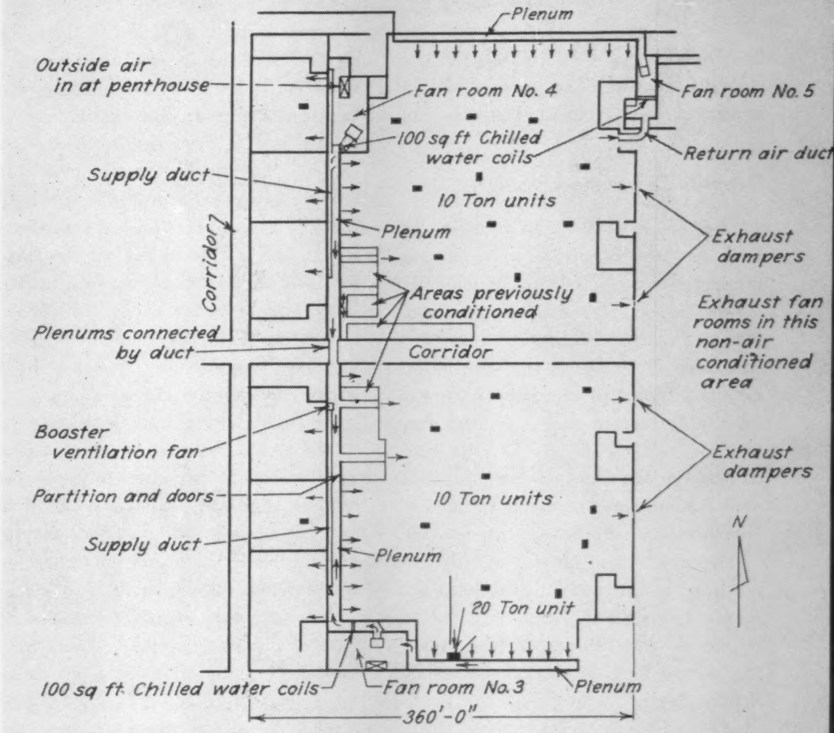
The required area had actually never been air conditioned; the incoming air had been cooled a few degrees and was commonly termed "cooled ventilation."

It is generally recognized that, in most cases, ventilation cooling is dependent upon large volumes of air removing heat by a few degrees change in temperature, whereas the air conditioning load is increased tremendously if the units are compelled to handle large volumes of outside air in the cooling season. Consequently, in calculating the air conditioning load, excessive ventilating air may be a liability instead of an asset.

Why Package Units Chosen

At first it appeared that in this case the logical solution was to add water chiller capacity and expand the system. This plan, however, would have necessitated a very extensive duct system or multiple remote coil units. An alternate plan was to use package air conditioners.

After all plans were carefully evaluated, it was decided that package air conditioners could be used to supplement the present cooling system, provide adequate distribution, and allow the scheduling of units according to relative requirements.


Plenum
Outside air in at penthouse
Fan room No. 4
Fan room No. 5
100 sq ft Chilled water coils
Return air duc
Supply duct
10 Ton units
Corridor
Plenum
Exhaust dampers
Areas previously conditioned
Exhaust fan rooms in this non-air conditioned area
Plenums connected by duct
Corridor
Booster ventilation fan
Exhaust dampers
Partition and doors
10 Ton units
N
Supply duct
Plenum
20 Ton unit
100 sq ft Chilled water coils
Fan room No. 3
Plenum
360'-0"

3 TWO LARGE OFFICES totaling 180,000 sq ft are conditioned year 'round by package units and two large fan rooms, using 100 percent recirculated air. Fan room No. 4 conditions ventilation air and, alone or in conjunction with package units, it serves the smaller office areas

The layout of the completed installation is shown in Fig. 3. Twenty-two 10 ton units and one 20 ton unit — which was already available — were installed throughout the area. Due to the size and location of the 20 ton unit, short ducts and eight four way air diffusers were used to cover an adequate area. No ducts were connected to any of the 10 ton units in the large office areas.

Satisfactory distribution was assured by taking several precautions. For instance, whereas the air distributor tops of the units were manufactured with diffuser outlets in three sides, we added outlets to the fourth side to obtain better distribution for this particular type of application. Most of the office partitions are of expanded metal above 4 ft from the floor, and without caps. Even so, all units are set on iron bases of sufficient height to allow the air from the diffusers to blow over the tops of the 7 ft, 9 in. partitions.

Air Volumes Reduced

Inasmuch as the cooling capacity was being increased greatly by the package units, and the air movement throughout the area was not entirely dependent upon air from the plenums plus local fans, the volume of air blown through the coils in the three fan rooms was reduced markedly. This resulted in leaving air of a much lower temperature, humidity, and velocity from the plenum outlets. It was possible, therefore, to omit placing package air conditioning units in substantial areas adjacent to the plenums.

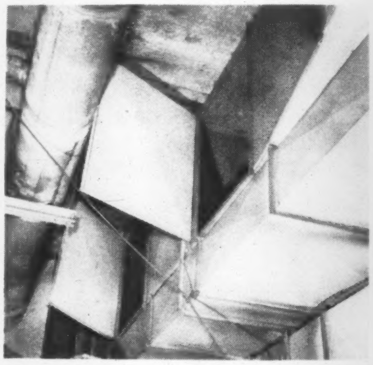
Prior to adding the package units, when it had been necessary to blow large quantities of outside air through the plenum chambers, there were times when an odor of exhaust fumes from the jet engine test cells could be detected.

Alter Existing Plenums

The jet engine test cells are near fan room No. 3, whereas fan room No. 4 is approximately 700 ft distant. Inasmuch as fan No. 4 could easily provide at least 30 cfm of outdoor air per person at a very satisfactory pressure, provision was made to distribute this air through both the north and south plenums. A connecting duct was installed between the two plenums and also a partition in the south plenum to prevent interference with the recirculation pattern of plenum system No. 3.

Plenum system No. 3 was altered to provide recirculation by adding partitions at the fan room, as shown in Fig. 3, while recirculation was provided at plenum system No. 5 by adding a return duct as shown.

Fig. 5 shows the 100 sq ft of water cooling coils in fan room No.



4 DOORS IN DUCT are close to 100 sq ft cooling coil and act as scoops to direct air into ducts

5 WATER COOLING COILS in fan room No. 5 total 100 sq ft. With air velocity low, no moisture is blown off

5. Although space is limited, the air velocity required is low, and no moisture is blown from the coils.

Provide Integrated System

The net result is a number of package air conditioners and two large fan rooms, all acting as air conditioning units and all operating 100 percent recirculation, while fan room No. 4 serves as the ventilation air conditioner. It can supply the air at a temperature and humidity low enough to provide air conditioning in areas adjacent to the plenums and does not impose too much of an outside air load on the packaged units.

The units were located strictly according to projected load requirements. Even though desks are placed within a few inches of the units, there have been no noise complaints. Where floor drains were not available to handle condensation from coils, small sump pumps were connected to the 115 v control circuit. The condensate was pumped overhead, and from there to the most accessible drain.

Later the condensate problem was simplified further on additional units by using sump pumps set in small containers, but without water level controls. They are connected in the compressor control circuit and run when a condensing unit is in operation. The saving in space allows the pumps to be set within the units and the savings, in initial cost and maintenance as compared with the complete sump pump unit, outweigh the slight extra cost of current.

Desks are set very close to the air conditioning units. Although noise level has not been a disturbing problem, in several instances where desks were very close to the return air intake grilles at the base of the unit, there were complaints of drafts.

In each case, complete satisfaction resulted when an additional opening was cut at the rear of the unit and covered with expanded metal, thereby reducing the volume of return air admitted at the front of the unit.

The smaller office areas west of the plenum are cooled entirely by the chilled outdoor air from fan room No. 4 or in conjunction with package units, depending upon the load requirements and availability of ducts. Two of these smaller areas are cooled entirely by the plenum air which then discharges into the hall. In two other areas the air conditioning units blow from the air distributor, and also through ducts attached to part of the outlet.

Ventilation to these smaller offices had been supplied by separate ducts within the plenum chambers. A 3 hp centrifugal booster fan was installed in the south plenum chamber to provide sufficient pressure to blow the chilled ventilating air into the duct system and a satisfactory surplus back into the plenum chamber on the far end, all shown in Fig. 3.

In the north plenum chamber no booster fan was required. Doors were installed in the duct near the coils, as shown in Fig. 4, and used as scoops to direct the air into the ducts. The velocity and pressure were sufficient to provide satisfactory distribution in both directions.

Since all of the spill air from the air conditioned areas west of the corridor discharged into the hall, it became practical to shut off a 25 hp fan supplying air to several locker rooms. Better results were obtained by simply allowing the very adequate exhaust system from these rooms to pull the cool hall air through large grilles above the doors.

Time Switches Control Units

Not only was the resultant installed cost per ton very low, but the reduced air requirements from the previous system converted "cooled ventilation" to air conditioning, provided a capacity equal to the capacity of that added in package units, or a total of 500 tons.

In addition to the elimination of the 25 hp fan previously mentioned, there were other savings less evident. The other plenum fan loads were reduced. Much less heating was required in winter. In a basement area such as this with a high lighting load, cooling is required throughout the year. In the heating season the outside air must be heated to approximately 70 F before it is blown into the area.

Another step toward economical operation was made by installing time switches on all package units and the two large recirculating fans. The cooling system is inoperative during "off hours" except for approximately 2 hours before working time and any special hours. If a group is working late, the timers are reset on package units affecting only those particular areas. ‡

Rockefeller Center Boasts 15,382 Ton Cooling Capacity

. . . world's largest for office buildings

ROCKEFELLER CENTER'S integrated air conditioning system became the largest in the world for office buildings recently with the start of operation of two new large compressors serving the 31 story Americas Bldg., according to a joint announcement by Carrier Corp. and Rockefeller Center, Inc.

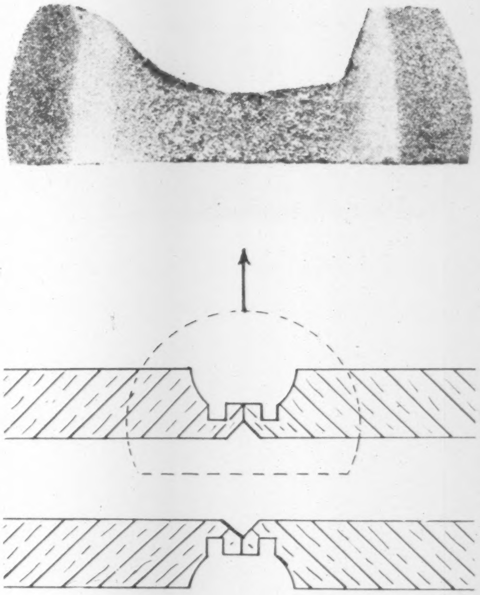
The installation of the additional equipment dropped the Pentagon in Washington into second place after a 15 year reign as leader.

The compressors serving the New York City 15 building skyscraper development now have a rated capacity of 15,382 tons.

G. S. Eyssell, president of Rockefeller Center, Inc., reports that the development's air conditioning equipment and installation to date represents an investment of $12 million.

"Our plans call for a total cooling capacity of 17,700 tons in Rockefeller Center buildings already in existence. This is exclusive of the equipment in the new 47 story Time & Life Bldg. now under construction and scheduled for completion late in 1959," Mr. Eyssell said.

All 20 restaurants and the nearly 150 stores in the Center are air conditioned by six central plants which serve the "city within a city." ‡



1 JOINT GEOMETRY illustrated in drawing below, while photomacrograph shows penetration, quality of welding root pass in carbon steel pipe after welding

New Joint Design Fills the Bill

. . . for making root pass welds in steel and stainless steel pipe butt joints

BY L. C. LEMON[*] AND W. R. SMITH[**]

FABRICATING equipment and piping systems for atomic energy and other uses has amplified the need for an economical, dependable, and practical joint design and welding technique for making pipe butt joints in steel and stainless steel.

To be sound such a root pass weld must have complete penetration and uniform weld reinforcement on the far side of the joint in all positions of welding, with no danger of burn-through. (The quality of the penetration is readily indicated by a visual inspection of the near side of the root pass.) To be practical the joint must be made economically with the minimum of welder skills required in all positions of welding.

This need may have been fulfilled with the design of the joint shown in Fig. 1.

The joint preparation consists of machining the root edges so that there is a raised edge on the near side and a slight bevel on the far side. The raised edges provide the metal required to replace that which was removed in forming the bevels on the far side.

This joint geometry provides for a weld bead in which the surface tension forces are sufficient to overcome the gravitational forces in all positions of welding. As a result, the required uniform penetration is obtained with no tendency to burn through or fall out in a wide range of welding conditions.

In addition to stainless, carbon, and low alloy steels, the joint has been employed successfully for joining aluminum piping and it is considered that it can be employed for other metals and alloys as well.

Investigations into what welding methods might be used have shown that the inert-gas tungsten-arc process is the best to be employed for making root passes using this joint design.

An inert-gas backup or purge is required for making root passes in stainless steel when using this process if a smooth, uniform, unoxidized surface is to be obtained on the far side of the weld. Some gas purges are dry nitrogen, helium, and argon.

There is some disagreement among investigators on purges for carbon or low alloy steels. Some feel that a helium or argon backup is required, while others indicate that none at all is needed. More experimental work must be done to determine for sure if a backup gas is required. Also, more data is needed on what grades of steel can be welded using the inert-gas tungsten-arc process. ‡

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[*] *Engineer, General Electric Co., Hanford Atomic Products Operation.*

[**] *Specialist, Materials and Welding, General Electric Co., Atomic Power Equipment Dept.*

This article is adapted from a paper presented at the 1957 American Welding Society National Spring Meeting.

Case Histories from a Consulting Engineer's Files

Modern air conditioning systems, for efficient and satisfactory operation, must be correctly designed. Here are three typical cases from the author's experience where original design was faulty and had to be corrected.

BY C. T. BAKER

Consulting Engineer

• vexed by range of costs, capacities

THE BOARD OF DIRECTORS of a social club authorized the manager to obtain bids from several contractors on an air conditioning installation for the combined ballroom and bar on the club's second floor. A number of contractors submitted bids.

On the date set for opening the bids, the board met to decide upon the merits of the proposals and to award the contract. Much to the amazement of the group, this proved a far more difficult decision to make than anyone had anticipated. Because of the lack of uniformity in tonnage requirements, indoor and outdoor dry and wet bulb temperatures — on which tonnage had been based — and finally, the great discrepancy between installed cost submitted by the various bidders, there was no basis on which to evaluate the proposals.

No specifications on the proposed installation had been prepared, so each bidder submitted a price based on the type and size of equipment which, in his opinion, would best serve the requirements. The accumulated effect was confusion. The board finally gave up trying to reconcile the proposals. The manager was then authorized to employ an engineer to analyze the bids and make recommendations, and I was asked to perform this service.

Based on conservative calculations — applying the recognized heat transfer coefficients, heat released from the maximum number of persons occupying the dance floor and bar at one time, and evaluating other basic factors — I found a heat gain equal to nearly 40 tons of refrigeration.

In contrasts, most of the proposals were far out of line with this. For example, one bidder proposed a 15 ton unit; another, two 7½ ton units. A third figured a 30 ton unit for $9100, not including wiring, a water supply system or a cooling tower. A fourth bidder figured the load at 34 tons, and his proposal included a pump and cooling tower, but no wiring. His bid was $12,250.

A fifth contractor offered a 25 ton installation for $10,900, but his proposal consisted of about five paragraphs that included no mention of any of the things required to make up a complete air conditioning system. Moreover, his signature was typewritten.

A joint proposition was submitted by an electrical firm and a concern who acted as agent for the manufacturer of selfcontained units. This proposal called for five 8 ton units — 40 tons — and the bid was $13,202, not including the electrical work, which would have added $1650. An interesting thing about this proposal was that neither the equipment dealer nor the electrical company guaranteed performance or anything else. In other words, there was no overall guarantee. The door was left open, in case of trouble, for the first concern to lay it at the feet of the other and vice-versa.

Another concern submitted a bid on five selfcontained units of 7½ tons each, making a total of 37½ tons. There were no specifications; only a one page letter and a blueprint.

The high bidder proposed a 52½ ton unit for $18,000.

An astonishing point about these bids was the variation in the wet and dry bulb temperature planes selected by the different bidders. For example: one company based operations on 90 F outside DB and 74 F WB temperatures. Another figured design conditions as 80 F DB inside with 50 percent relative humidity, and 95 F DB and 70 F WB temperatures. Prevailing wet and dry bulb temperatures in the area affected are nearer 95 F DB outside and 78 F WB than anything else.

The only bidder to submit a complete proposal, offering a 40 ton plant complete with cooling tower, water pump, and wiring for $15,691 was awarded the contract.

Since its installation, the operation of this plant has been entirely satisfactory.

Commenting on this situation, following the selection of the contractor, the club manager remarked that, judging from his first experience in attempting to buy installed air conditioning, there was evidently something wrong somewhere. Otherwise, there would not be such great discrepancies in costs and capacities.

• need adequate engineering to prevent foul air

THE SIGN on the glass front of four large drug stores reads, "It's Cool Inside, Completely Air Conditioned." Entering these stores, the customer immediately reacts to the foul air inside. Looking around for the source of this unsatisfactory condition, he will find a nice appearing cabinet in the rear of the store. A sign on the cabinet reads, "Installed by John Doe and Co., Air Conditioning Engineers."

Looking for an outdoor air supply, he finds none. He asks the clerks, "How can you stand to spend hours breathing such foul air?" The reply generally is, "Oh, we get used to it. Besides, it's a lot cooler in here since the store was air conditioned."

The writer recently stopped in a small branch air lines office to secure flight information. Here again was a severe case of foul air resulting from almost a hermetically sealed room, a well known make of air conditioning cabinet, and the usual sign telling customers that the place was air conditioned.

Of course, if the air conditioning used in these places had been arranged for proper ventilation of the enclosure, it would have cost a little more. The system would have been a little larger and would have occupied a little more space. Generally, however, it is a matter of dollars and cents.

Sometimes the situation is explained to the buyer beforehand, and the salesman is told, "I don't want to spend the money." In other instances — far too many in fact — the owner is not told that to properly air condition his place of business, he needs ventilation as a part of the installation.

One salesman for air conditioning equipment when discussing this situation with the writer remarked, "Yes, I know it's not good practice to set up a cabinet in a store and not provide outside air ventilation but if I tell the prospective buyer these things, and he finds that to do the right kind of a job will cost more money, I lose out. So now I just don't tell him anything. I 'case the joint' and try to sell him what I think he will buy."

If one has an ear to the ground, he will discover that there are many complaints from buyers of air conditioning equipment. There is also criticism from many who have listened to radio and television ballyhoo about the great advances in air conditioning for human comfort who later are disappointed in their investment.

• bidders' incomplete specs cause confusion, misunderstanding

RECENTLY I was asked to tabulate several bids covering a proposed air conditioning installation and to recommend the most suitable, all things considered. The letter from the purchaser asking for bids contained but little information concerning what was to be furnished. All but one of the proposals submitted by six bidders were less complete than the specifications asking for proposals covering the project. The specifications called for a total of 11 self-contained units.

Of the six proposals submitted, only one bidder named the capacity in Btu per hr of any of the 11 units offered. Two bidders failed to state the make equipment they would furnish.

No mention was made by any of the six bidders as to how much, if any, outside ventilating air would be supplied.

Only two of the six bidders made mention of the outside and inside wet and dry bulb temperatures upon which the capacity of their units was based. Only one bidder out of six named the head or capacity of the condensing water pump they would furnish.

Four bidders failed to give the make or capacity of the cooling tower they would furnish. A water softener had been specified in the letter inviting bids, but no mention was made in the letter as to capacity, type or construction of the tower to be furnished.

No information was supplied on the water conditioning equipment by any of the bidders.

No mention was made as to the number of grains of hardness in the water leaving the softener.

All proposals included a flock of bulletins showing pretty pictures, along with other descriptive literature, but none of the proposals specifically tied the literature and the submitted contract together. The whole question of what was the intent, what exactly was to be furnished, was left up in the air.

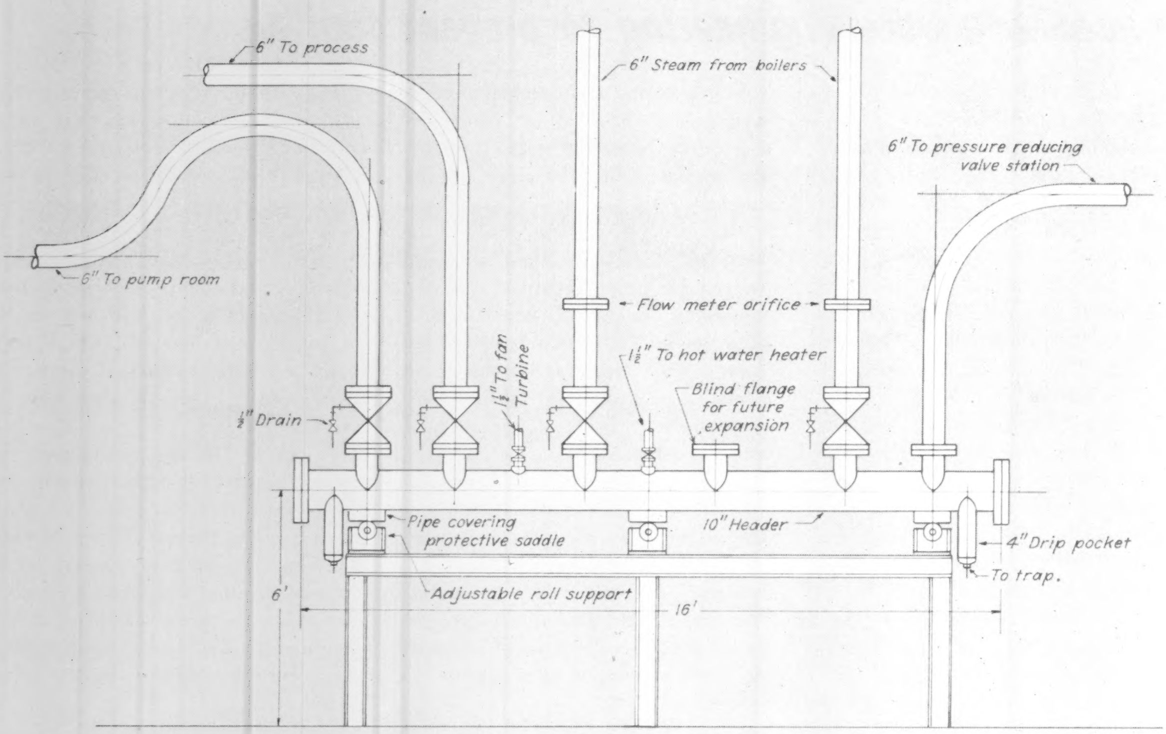
Pricewise, the quotations covered a wide range. The low bid was $14,479, while the high bid, supposedly covering the same equipment and service, was $34,622, a difference of $20,143 between the high and low bid.

The other bids were within $2000 of the low bidder.

Out of the total of six bidders, only one, the low bidder, had the background of experience and the facilities that the size of the project warranted.

Something evidently is wrong somewhere, otherwise, there would not be a difference of more than $20,000 between the high and low bid.

So long as bids are called for on meager specifications, confusion and misunderstanding may be expected in the proposals submitted. ≠


6" To process
6" Steam from boilers
6" To pressure reducing valve station
6" To pump room
Flow meter orifice
1½" To fan Turbine
1½" To hot water heater
Blind flange for future expansion
½" Drain
Pipe covering protective saddle
10" Header
4" Drip pocket
To trap.
Adjustable roll support
6'
16'

1 DRIPS AND DRAINS in this industrial plant's main steam header prevent dangerous slugs of condensate from traveling at high velocity and causing damage

Drips and Drains Vital To Safe, Efficient Piping Systems

Adequate provision of drips and drains is essential to collect and remove condensate in order to prevent damage and insure efficient operation of steam piping.

BY G. W. HAUCK
Manager, Engineering Sales
Crane Co.

RELATIVELY SMALL in size, drips and drains can loom up mighty big in importance in a piping system.

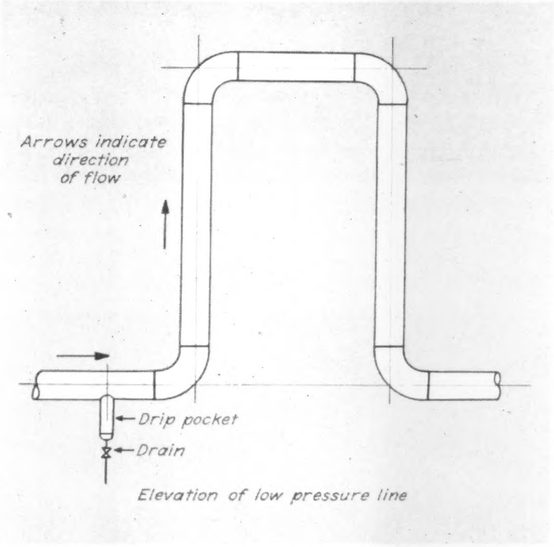
It is hard to understand why many piping systems are in operation without adequate provisions for drips and drains. One must admit that such piping is workable — up to a point — but it certainly represents the minimum in equipment. What about the damage that may be exacting its toll and the potential hazards that may exist? The omission of one small valve in a vital spot can spell big trouble. The addition of that small valve can represent the wisest investment.

The ASA Code for Pressure Piping is clear on this, a portion of Paragraph 118 reading as follows:

"Suitable drains or drips shall be provided wherever necessary to drain the condensate from all sections of the piping and equipment wherever it can collect. Suitable drains shall also be provided to empty water lines, water storage tanks, equipment containing water, etc., when such piping and equipment is out of service. At least one drain valve shall be placed in each drip or drain line."

The ASME Boiler and Pressure Vessel Code is equally plain, P-304 reading in part as follows:

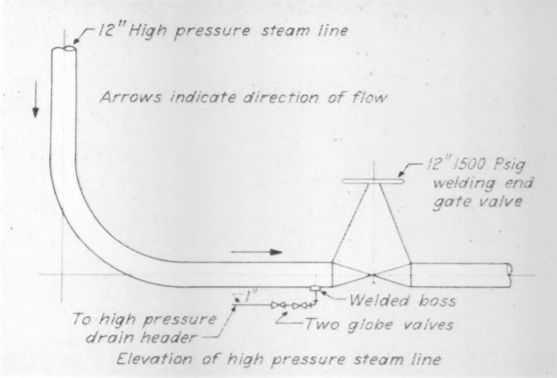
"When a stop valve is so located that water can ac-


Arrows indicate direction of flow
Drip pocket
Drain
Elevation of low pressure line

2 EXPANSION BEND that is vertically installed requires a drip pocket and drain valve, as shown here. All risers should have drains

cumulate, ample drains shall be provided."

The importance of drains is emphasized in Fig. 1. Here is an industrial plant's main steam header and its connected piping. Saturated steam is generated at 150 psig for processing services. Whenever any of the gate valves at this header are closed, condensate can accumulate above the disc. If such a valve is opened without first draining the condensate, a dangerous slug of water may travel at high velocity and cause serious damage. It is obvious, therefore, that although those four ½ in. drain valves are relatively small in size compared with the header and its valves, they perform a vital function, thereby qualifying as important, necessary piping accessories.


12" High pressure steam line
Arrows indicate direction of flow
12" 1500 Psig welding end gate valve
1"
Welded boss
To high pressure drain header
Two globe valves
Elevation of high pressure steam line

3 DRIP CONNECTIONS provide for removal of condensate after any shutdown and whenever high pressure, high temperature steam piping is brought to full operating temperature

A riser or any type of expansion pipe bend that is installed vertically in a steam line should have a drain, as shown in Fig. 2.

High pressure, high temperature steam piping finds a similar need for drip connections, as shown in Fig. 3. Condensate can collect and should be removed after any shutdown as well as during the time the line is being brought up to full operating temperature. ǂ

The author is a member of HPAC's board of consulting and contributing editors and has prepared numerous articles for publication in HPAC.

Other articles on piping hookups will be published in future issues of HPAC. Previous articles were in the September and October HPAC's.

How Air Conditioning Solves Printing Plant Problems

. . . considered necessary to operation

A 500 TON air conditioning system is being installed in a new million dollar plant in Austin, Texas, to assure trouble free production and higher quality finished products, according to The Trane Co.

R. H. Porter, president of The Steck Co. said, "we consider air conditioning necessary to our operation."

Two 250 hp automatic hermetic centrifugal refrigeration units will serve the system.

Close control of humidity prevents distortion, curling, or buckling of paper, permits better ink drying procedure, and curbs static electricity generated by paper and machines.

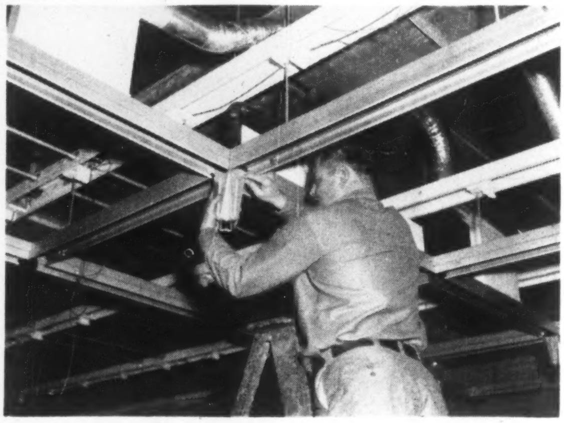
The major problem encountered in planning was the sudden loss of internal heat from lights, motors, and employees at various periods.

Reheat, using steam, to offset these temporary heat losses assures constant temperature and humidity conditions. Design conditions for the entire plant are 75 F dry bulb and 45 percent relative humidity, with provisions for field variation in the several types of work areas.

Air conditioning is also expected to help provide more accurate positioning of colors in multicolor printing, prevent warping of engravings, and keep press rollers from swelling and shrinking.

B. Segall, Jr., is the consulting engineer, and J. M. Boyer, the air conditioning contractor. ǂ

LATERAL AIR DIFFUSION, required in large volume, prevents too much of a downward air flow, avoiding draft in either the heating or cooling cycle



SPRINKLER PIPING is integrated with the ceiling, as are lighting panels, flexible warm and cold air ducts, and acoustical baffles. Note thin rectangular air outlets above baffles

Modular Ceiling Cuts Cooling Load

. . . from 25 to 20 tons in new office building as a result of high frequency lighting system. Diffusers integrated with acoustic baffles supply a large volume of air laterally without draft.

BY LESTER T. AVERY

President
Avery Engineering Co.

THE YEAR 'ROUND air conditioning system in the new office building of The Wakefield Co., Vermilion, Ohio, involved several new problems.

Had Wakefield not chosen its own new building for the initial installation of the 840 cycle, 400 v lighting system in its offices, the air conditioning problems would have been considerably greater. This high frequency system utilizes a small capacitor for each of the 580 4 ft lamps. The loss for a conventional ballast is 10 to 15 w per lamp. The loss of these tiny capacitors is only 1½ w, with a like amount lost in the power factor correction coil on each lamp. The reduction in ballast heat amounts to 2 tons of refrigeration, a very appreciable saving.

The luminous ceiling — acrylic plastic — panels with their acoustical baffles, which also diffuse the air, are clear, with no obstructions. Bottoms of some of the baffles have channels which receive the tops of modular steel and steel-glass partitions.

The acoustical core inside the V-shaped baffles causes the air to diffuse laterally and thus prevent too much of a flow downward in the cooling cycle.

This modern one story building has a double glazed wall on the east side and a solid masonry exposed wall on the west side and south end. The north end adjoins an existing building.

The concrete slab floor was poured directly on the ground. The one story construction involved heat loss through the roof and sun effect, which had to be taken into consideration, along with the fact that the entire building is lighted by a suspended luminous ceiling with a lighting load of 27 kw.

Mixing damper equipment supplies conditioned air for zone control to the several main zones, based upon exposure and occupancy. In addition, a warm and cold air duct system extends the entire length of the 125 ft building so that individual small offices can receive independent control by the mixing damper principle.

The ceiling combines lighting panels, ventilating and acoustical baffles, and the sprinkler piping system. The air is brought into the office space through the myriad perforations in the acoustical baffles. Air reaches these baffles through flexible ducts at the top, and it circulates around the acoustical glass fiber cores.

The return air is collected through grilles under the double glazing on the east side. In an underground tunnel it is taken back to the equipment room for conventional mixing with outside air. Additional return air passes through the door opening into offices on the west. This comes back to the unit through a grille in the corridor. These returns were balanced out with the supplies in order to provide the necessary zone and room air quantities.

The great lighting load combined with the sun's heat required 20 tons of refrigeration, with 11,000 cfm of air to be supplied to an area totaling only 5000 sq ft. Thus, the average air supply is 2 cfm per sq ft of floor area. This has always been a problem in conventional systems, since the high air quantities do contribute to complaints about drafts. By using the proper number of the baffle outlets at an air volume of 95 to 105 cfm each, the air is diffused through the occupied space and carried to the return without objectionable draft in either the heating or cooling cycle. Temperatures are uniform in all zones.

An electrostatic filter is used to filter all air, both recirculated and outside.

The architects were Outcalt, Guenther and Associates. The consulting engineers were Bennett & Associates. ≠

Interpret Pressure Piping Code

HPAC PERIODICALLY PUBLISHES for the information of interested parties certain actions of the Sectional Committee B31 on the American Standards Code for Pressure Piping, sponsored by the American Society of Mechanical Engineers. While these actions do not constitute formal revision of the code, they represent the considered opinion of the committee.

Pending revision of the Code for Pressure Piping, ASA B31.1-1955, the committee has recommended that ASME make public certain interpretations.

The following are interim actions and will not constitute a part of the code until formal action has been taken by ASME and by the American Standards Association.

Case No. 26

Inquiry: May Types 304 and 304L grades of stainless steel be used for piping in nuclear energy installations under the rules of Section 1 of the Code for Pressure Piping?

Reply: It is the opinion of the committee that Types 304 and 304L stainless steels may be used in nuclear energy installations for construction under Section 1, provided the following conditions are observed:

1) The materials shall at least conform to one of the following specifications:

Pipe	A376 A358
Welding Fittings	ASTM A403
Forgings	ASTM A182

2) If welding is employed, all welds shall be fully radiographed.

3) The design temperature shall not exceed 800 F.

4) The allowable stress values for seamless materials shall be as follows:

Temperature, F	Type 304	Type 304L
−20 to 100	18,750	17,500
to 200	16,650	17,000
to 300	15,000	13,400
to 400	13,650	11,000
to 500	12,500	9,700
to 600	11,600	9,000
to 650	11,200	8,750
to 700	10,800	8,500
to 750	10,400	8,300
to 800	10,000	8,100

Note: These stress values do NOT include joint efficiency or quality factors.

5) A joint factor of 0.95 shall be applied to welded construction that has been fully radiographed.

Case No. 28

Inquiry: Are steel pipe flanges, flanged fittings, and flanged valves, having raised faces and using gaskets of materials, constructions, and dimensions conforming to MSS Standard Practice SP-47, permissible as ASA B16.5-1953 Class A rated flanged joints under Section 3 of ASA B31.1-1955, Code for Pressure Piping?

Reply: It is the opinion of the committee that flanges having raised faces, and using gaskets of materials, constructions, and dimensions within the limits stipulated by MSS Standard Practice SP-47, are satisfactory for use as ASA B16.5-1953 Class A rated flanged joints under Sections 1, 3, and 5 of ASA B31.1-1955, Code for Pressure Piping.

Case No. 27

Inquiry: May bolting material conforming to ASTM A193, Grade B7, be used at temperatures not lower than −50 F?

Reply: It is the opinion of the committee that bolting materials conforming to ASTM A193, Grade B7, liquid quenched and tempered, with ASTM A194 Class 2H nuts, may be used under Sections 3 and 5 of ASA B31.1-1955 on standard ASA flanges at temperatures not lower than −50 F without impact test. ≠

Portable Instruments Outmode Trial and Error Balancing

. . . of central hot water heating systems

BY J. P. DUFFY
Engineer
Sarcotherm Controls, Inc.

and

W. J. BAILEY
Application Engineer
Illinois Testing Laboratories

ALTHOUGH all heating contractors recognize the need for balance in a hot water system, many of them still believe that balancing can be accomplished by trial and error in feeling the pipes. A large central heating system must be set by a more accurate means than this in order to be satisfactory.

In walking from one building to another, the temperature of the pipe-feeler's hand changes and this influences his judgment. This one factor alone can mean expensive trouble when it results in unbalance in a system for one or more apartment buildings.

Equal Temperature Drops Expected

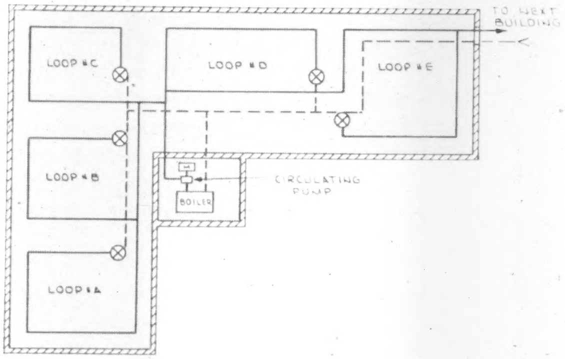
A good balance can be promptly and systematically obtained using a portable surface temperature pyrometer. It has been observed that the labor savings effected by the contractor in doing only one job with this instrument may pay for the pyrometer and provide a dividend by the elimination of costly return calls.

The fundamental principle is that, in a hot water heating system which is properly designed and installed, equal temperature drops are expected across the many pipe loops which are fed by the central heating plant.

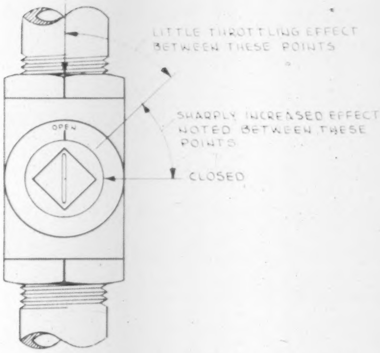
Perhaps the best way to illustrate the application of one method to accomplish this is to discuss an actual case involving a seven building apartment group in the Washington, D. C., area which is served by a typical well designed heating system.

The contractor who made the installation and initial adjustments was called back to the buildings repeatedly in order to establish more nearly satisfactory temperature levels. His foreman had made frequent attempts to even off the heat between buildings by feeling the pipes and had declared that he could not improve the balance further. When severe winter weather came, however, the building owners found themselves in serious trouble. In some of the exposed buildings the room temperatures were in the range of 60 F while at the same time tenants in other buildings had their windows open in an attempt to keep their room temperatures below 80 F. The dampers on their convectors were not tight enough to limit the excess heat being supplied.

Fuel bills were unnecessarily high, but the night depression feature could not be used for fear of freezing some of the already underheated buildings. The control valve in the boiler room had been completely bypassed in order to get the maximum water temperature and hence it could not compensate for the changes in outdoor temperatures. This required the use of excess fuel, which caused the boiler tubes to soot up faster than usual. Tenant complaints multiplied and fuel consumption mounted until it was decided to obtain some instrument that would enable an engineer to equalize the temperatures in the



2 MECHANICAL PLANS of a seven building apartment group served as the basis for the balancing procedure


LITTLE THROTTLING EFFECT BETWEEN THESE POINTS
SHARPLY INCREASED EFFECT NOTED BETWEEN THESE POINTS
OPEN
CLOSED

3 SQUAREHEAD COCK controlled amount of water flowing in each of 20 pipe loops. Each was adjusted according to the action required, noted in Table 1

seven buildings, following a technique that was known to work.

A surface temperature pyrometer was procured because it has the ability to measure quickly and accurately the temperature of the hot water pipes. The mechanical plans of the heating pipes in each building were obtained, and they served as the basis for the balancing routine. Upon examination of the plans, it was seen that the installation consisted of a hot water boiler, a circulating pump, a control valve, and 20 separate pipe loops in the seven buildings as shown in Fig. 2. The amount of water flowing in each pipe loop was controlled by a squarehead cock, as shown in Fig. 3.

Each one of these 20 valves was assigned a letter on the building plans and also on the pipe insulation adjacent to the valve itself. A list was prepared on which were listed all of these letters so that the temperature measurements for each loop could be easily recorded.

Using the surface temperature pyrometer and a thermocouple, one complete set of temperature measurements was made for the 20 loops and the main supply pipe carrying water from the control valve. The thermocouple was applied to a clean spot on the return pipe from each loop at a point just before the water reached the squarehead cock. The results are shown in Table 1, Trial No. 1.

TABLE 1—TEMPERATURE DROP for each pipe loop, measured by using a surface temperature pyrometer and a thermocouple, is shown here for two trials

Trial			No. 1			No. 2
Outdoor temperature, F			55			32
Control outlet temperature, F			140			168
Loop	Return temperature, F	Loop drop	Action required	Return temperature, F	Loop drop	Action required
A	137	3	Close	162	6	Close
B	136	4	Close	160	8	Close
C	130	10	Leave	159	9	Close
D	132	8	Close	156	12	
E	135	5	Close	153	15	
F	135	5	Close	158	10	Close
G	132	8	Close	156	12	
H	115	25	Open	151	17	
J	130	10	Leave	158	10	Close
K	123	17	Open	153	15	
L	125	15	Open	154	14	
M	120	20	Open	150	18	
N	118	22	Open	148	20	

The supply water temperature was 140 F in Trial No. 1, and the return water temperature in loop A was 137 F, with a temperature drop of 3 F. From the variation among all the temperature drops, one can see why some of the apartments were being underheated while others were receiving too much heat. Those loops which showed too great a temperature drop needed more water, while those showing too small a drop needed to have the flow of water through them reduced. Although most systems are designed for a 20 F drop, this figure may not work out in practice because of many variables.

Select "Reference" Temperature Drop

After the first series of readings was made and the computations were completed, it was necessary to select a "reference" temperature drop so that all of the pipe loops having temperature drops differing from this chosen amount could be appropriately adjusted. In this trial, 10 F was the reference, and the recommended action for each pipe loop is entered on Table 1. It is here that experience with the throttling action of the common squarehead cock proved to be helpful. As noted in Fig. 2 the first 45 deg of motion away from the full open position causes very little reduction in the amount of flow. Most of the throttling occurs during the next 45 deg of rotation toward the fully closed position.

Adjust Squarehead Cocks Systematically

The next step was to go back to each one of the cocks and to put on the plug and the valve body a red pencil mark to show the initial setting. Then the cocks were adjusted in accordance with the program for action shown in Table 1. Perhaps it should be mentioned here that when a plug is to be rotated, its locking nut should be loosened and the plug should be tapped slightly to release the grip of the taper. If the locking nut is not eased first, there is a chance that the two surfaces of the taper will gall and bind. When this has happened, the plug will be difficult to adjust and very likely will leak.

When properly handled, the plug is easily reseated and locked after making the desired adjustment.

In those cases where globe valves have been used on the ends of the pipe loops, it becomes necessary to tie a piece of string on the handle and to count the number of turns that the valve is open. Actually, it is easier to arrive at a proper setting with globe valves because there is a definite relation between the movement of the valve wheel and the restriction on water flow. They have better throttling characteristics than the squarehead cocks.

Take Additional Readings

After this heating system had been allowed to stabilize for a day, another set of readings was taken and these measurements are recorded in Table 1, Trial No. 2. At this same time, a blue pencil mark was put on each of the cocks to show the second position of the plugs. From a study of the readings in Trial No. 2, some further action was determined and was carried out. Again the system was allowed to operate for a day and then a third set of readings was taken. When one has had some experience with this kind of a system, this number of trials will usually result in a satisfactory balance.

Final Average Temperature Drop Was 21 F

In this case the final average temperature drop was 21 F, which is slightly above the usual design figure, suggesting that the pump capacity may have been somewhat low. Of course, this condition was corrected by setting the control valve a little higher than normal. With this control back in operation, its night setback feature — which could now be used without fear of freezing any building — and its modulation of the water temperature in accordance with the outdoor temperature provided real decreases in fuel consumption. Room temperatures were found to be uniform and there have been no more complaints from tenants.

Eight Points Should Be Emphasized

Thus, by following a systematic program of measuring pipe temperatures and making the appropriate adjustments, one can balance even a large central hot water heating installation very promptly and with a minimum of inconvenience to the building tenants. There are eight points which should be emphasized.

1) Use a data sheet to keep the temperature readings in proper order and to avoid guesswork.

2) Clean a little spot on each pipe where measurements are to be taken so that they will be accurate and reproducible.

3) Use a reliable temperature measuring instrument.

4) Get acquainted with the throttling characteristics of the valves in the heating system.

5) Be sure to mark the plug positions in the cocks as you make adjustments.

6) Allow time for the adjustments to take effect.

7) Do the balancing job at a time when there is some heat loss from the building so that there will be a sensible heat transfer through the convectors or radiators.

8) Be sure to mark the final valve or plug positions so that they can be accurately reset in case they get moved later on. ‡

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14 Package Units Condition Resort Hotel

. . . 3 to 15 ton sizes serve dining, convention spaces

FOURTEEN package unit air conditioners serve the convention floor and two main dining areas of the Ritz-Carlton hotel, Atlantic City, N.J. The units range in size from 3 to 15 tons and have a combined cooling capacity of 147 tons, according to Airtemp Div., Chrysler Corp.

On the second floor, the Crystal dining room and Ocean Terrace room are each equipped with two 11 ton units. The third floor, with its several large ballrooms and private meeting rooms, is served by 10 similar units.

Piping, wiring, and outside air ducts are all concealed in crawl spaces underneath the floors of the newly air conditioned sections. The system was designed so that areas could be comfort zoned without ductwork. The only span of ductwork for air distribution is on the convention floor, where several smaller private rooms are served by a single conditioner.

The air conditioning contractor was McKee and McHale. ‡

The Law and Your Profits

BY WILLIAM HURD HILLYER

Get It in *Writing*

ANYONE DELIVERING heavy equipment is in danger of legal losses arising from injury to the receiver's personnel. The following case points up the need for a written description of where and how such equipment is to be delivered.

Nonaim Corp. purchased a heating system boiler section weighing 750 lb from Tophet Pipe & Supply Co.

A vice president of Tophet phoned I. M. Handie, Nonaim's piping maintenance man, at noon on the delivery day and told him that the boiler section would be delivered at around 4:30 p.m. and asked him if he would "be there and have a couple of men there?" Handie agreed.

The boiler section arrived in a truck operated by Skillmore, an employee of Tophet. He backed the truck to the door of the building.

As requested, Handie was on the spot with two other men. Skillmore produced skid boards. Handie and his two helpers, together with the truck driver, laid the boiler section flat, brought it to the rear of the truck, and skidded it to the door of the cellarway with the assistance of a rope threaded through a rack at the front of the truck.

The rope had been tied by Skillmore and was used as a winch to ease the section down the skids. The boiler section was tipped on end and pulled through the door.

According to testimony, Skillmore then took the skids from the truck, put them on the cellar stairs, and began to slide the boiler section down.

When the section was about 3 ft from Handie, he "saw the knot come untied." The section slid down and injured him as he was "standing on the next to last step."

The suit was brought by I. M. Handie against the Tophet Pipe & Supply Co. for injuries alleged to have been caused by the negligence of their employee, Skillmore.

Handie testified that he did not participate in the sliding operation, but "was just standing there, watching them," and "instructing them how to put it in."

On cross examination Handie stated that he was acting as "superintendent of the operation," but maintained that he "had nothing to do with the tying" of the rope.

Handie won a jury verdict in the trial court, but the judge set the verdict aside and entered judgment against Handie notwithstanding.

Handie appealed to the state supreme court.

Sustaining the verdict by reversing the judgment, the higher court made a number of observations that might prove pertinent to any delivery of heavy equipment. "There was no evidence presented by either party as to the terms of the delivery agreement."

Tophet's vice president testified that he knew of no arrangement as to where the boiler section was to have been delivered.

The supreme court saw sufficient evidence to warrant a finding by the trial court jury that Tophet undertook to contribute Skillmore and the equipment he had with him for use in the task of unloading.

This is inferred from the noontime telephone conversation between Handie and Tophet's vice president, from the driver's active participation in the work, and from the fact that he arrived at the premises with the skid boards and used them.

Likewise warranted in the light of that conversation, the court held, was the jury's conclusion that Skillmore "was acting in normal furtherance" of Tophet's business when he chose the method of unloading.

In addition, the court maintained, Handie's testimony regarding his supervision of the operation did not mean that Skillmore became his (legal) servant. That testimony could be reasonably interpreted as showing "merely that the plaintiff was directing the group in all matters affecting his employer's interest—as, for example, where to place the boiler section and the route to be followed—and that Handie himself was not participating in the physical work. It does not imply that Handie could control, or purport to control, Skillmore in the details of the unloading process.

On the contrary, it is a warrantable conclusion that Handie and his associates (in his employer's behalf) and Skillmore (in behalf of Tophet) "were engaged together in the unloading process" and the truck driver owed a duty to exercise "ordinary care for the safety of the group."

When no delivery agreement exists between parties and the operation takes place in the twilight zone of responsibility, the danger of damage suit loss faced by the delivering contractor is increased. ‡

WILLIAM HURD HILLYER, *author of this regular feature, is a contributor to a number of banking and financial publications and has written several books on business. He has an extensive practical legal and financial background.*

This series presents actual cases. Naturally, laws vary in different states. All names are fictitious.

1 ATOMIC AGE MILESTONE is the first privately financed structure in the U. S. built exclusively to manufacture nuclear reactor fuel elements and related nuclear products. The fuel plant, together with gatehouse, left, and steam plant, right, and a nuclear experiment facility not shown, is near Lynchburg, Va.

Continually Scour Air

. . . for employee safety and recovery of valuable materials

Other air control procedures vital for fuel element fabrication include carefully controlled differential air pressures, an average of 12 air changes per hr, and constant air monitoring. Also, a special recovery piping system collects liquid wastes and salvages valuable fissionable materials.

FUEL ELEMENT PRODUCTION at the Lynchburg, Va., nuclear facilities plant of the Babcock and Wilcox Co. requires a number of unusual techniques and modifications of standard equipment. The plant is the first major facility in the U. S. erected entirely at private expense to manufacture nuclear fuel elements and related products for peacetime use.

The new plant is divided into two spheres of activity: a nuclear fuel element fabrication unit and an experimental unit where reactor core components are studied and tested.

The fuel element fabrication plant is divided into three general sections: a manufacturing area; a laboratory area used for material accountability, quality control, and research and development; and an office, lunch room, and locker room area for personnel and administrative use.

The critical experiment facility, 1200 ft from the plant, consists of a concrete bay 35 ft high, which is the scene of actual testing activities, and a low wing of construction similar to that of the fabrication plant. The bay and other sections where fissionable materials are handled, have walls up to 3 ft thick for security purposes and to provide barriers to certain forms of nuclear activity.

Oil Fired Boilers Make Steam

In the fuel element fabrication area are also a gatehouse, steam plant, and maintenance building.

The steam plant covers a 40 by 80 ft area, and is equipped with an oil fired boiler and auxiliary equipment with a steam capacity of 22,000 lb per hr. A single stage 100 psig air compressor, with space reserved for a duplicate unit in the future, is also provided.

Personnel, purchasing, and security functions are quartered in a 30 by 40 ft brick gatehouse. Heated and cooled by a heat pump system, the building is the terminal and access control point of a linked wire fence enclosing the fabrication area.

Get Water from River and Wells

Despite the plant's proximity to the James river, there was some difficulty in meeting the water demands. Twelve widely separated wells were drilled at depths ranging from 150

2 LOWER AIR PRESSURE is maintained in the manufacturing area than in other areas to keep radioactive particles away from them. Particle and heat laden air is removed via central exhaust channels

in New Atom Fuel Plant

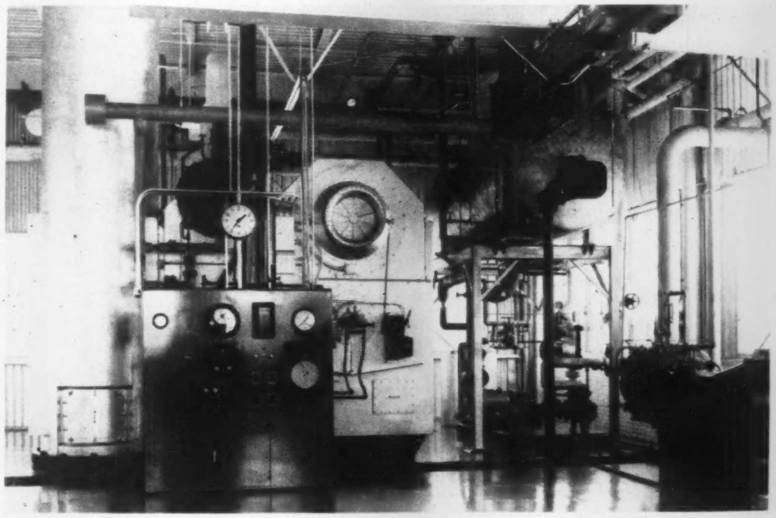
ft to 200 ft, with inadequate results. A filtration plant with an ultimate capacity of 350 gpm, using James river water, has since been completed to provide the pure water required by operations.

The filtration plant is a package type using a precipitator, gravity filtration, and chlorination. Supplementary equipment includes a 150,000 gal storage tank; a distribution system with a 6 in. fire main, hydrants, and hose houses; and a 1 in. line to the critical experiment building.

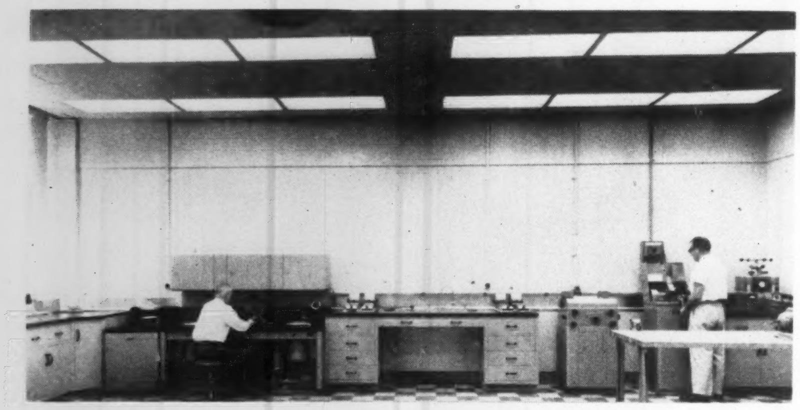
Filter Large Volumes of Air

Plant practices and equipment provide a strong barrier to the inadvertent escape of harmful wastes.

Employees work in an atmosphere that is being continually scoured of radioactive particles by special air moving and filtering equipment. Seven fan units exhaust more than 100,000 cfm of air from the fuel element manufacturing area. This amounts to about 12 complete changes of air per hr. All of the air exhausted from the plant passes through filters to assure retention of airborne radioactive particles. Individual exhausting units are provided for certain machines and laboratories, and wherever operations may develop a concentration of radioactive particles.



3 STEAM PLANT plays a vital supporting role in operations. Package type oil fired boiler, completely fabricated and assembled at factory, required only external connections for fuel, air, and electricity before being operated. Air compressor, right, supplies compressed air for plant



4 **AIR CONDITIONED LAB is provided for metallurgical analysis of fuel element materials. Analyses also check effectiveness of control measures and equipment**

The manufacturing area is maintained at a lower air pressure than other sections of the plant. As a result, air from the area where radioactive materials are processed is kept away from offices and is directed through central exhausting channels.

The fuel element manufacturing area is not air conditioned because of the enormous volume of air constantly being circulated from the outside. The incoming outdoor air, however, has a cooling effect. Some of the smaller sections of the fabrication building, as well as the entire critical experiment building, are air conditioned.

Any equipment which may be a potential source of radioactive contamination is equipped with a system of microscopically fine filters capable of removing a very high percentage of airborne particles. Should any harmful amounts of gases appear in the critical experiment facility, test activities would be shut down immediately by an exhaust monitoring system.

The effectiveness of control measures and equipment at the plant is checked constantly by more than 25 different portable and stationary types of instruments, as well as by laboratory analyses. Collection filters on all exhausting ducts, samples of working area surfaces, liquid wastes, ground surfaces, and the atmosphere in the plant vicinity, are monitored daily. Also, periodic surveys are conducted in the area surrounding as a further check on the total effectiveness of the radiation monitoring system.

Collect Wastes for Recovery

Liquid wastes which may contain radioactive or salvageable substances are carefully funneled to central points and monitored.

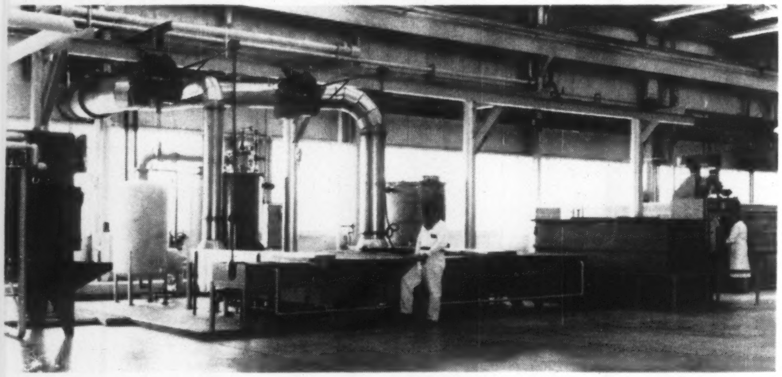
A special recovery area of 700 sq ft is in the floor of the fabrication plant and is surfaced with acid resistant brick. The recovery area is enclosed by a brick curb and slopes toward a stainless steel sump. Liquid wastes from units such as acid pickle, rinse and hold tanks, evaporator and filter press, are channeled to a 500 gal stainless steel sump tank in an acid brick well. The wastes collected in the tank are sampled and analyzed for possible salvage of fissionable material prior to their disposal.

A retention area for liquid wastes, called a tank farm, has been built about 1000 ft north of the fabrication building. The tank farm is housed in a separate structure and has a storage capacity of 4000 gal. Its three steel tanks are interconnected to permit successive or individual filling. Each tank is equipped with sampling, recirculating, and liquid measurement facilities. A discharge line connects the tank farm with sewage disposal lines.

In addition, liquid wastes from employees' showers are discharged into the river after dilution and treatment to reduce to safe limits any radioactivity they may contain. The limits are those prescribed by the U.S. Public Health Service with the advice of the U.S. Atomic Energy Commission and the National Bureau of Standards.

Should laboratory analyses of samples, whether liquid or solid, reveal the presence of recoverable fissionable materials, they will be sent to the U.S. Atomic Energy Commission for reprocessing. Solids that are collected as chips and dust from filter media are stored under oil in drums for shipment.

Radioactive materials from pickling, rinsing, and degreasing solutions are concentrated in an evaporator and are then shipped in polyethylene lined containers to the AEC. ‡



5 **RECOVERY AREA for pickling, rinsing, and drying fuel elements has, left to right, a drying oven, pickling and rinsing tanks, a degreasing unit, and a vapor blaster. Floor is lined with acid resistant brick, and slopes to sump. Wastes may be directed from sump for processing in filter press, not shown, or evaporator, left center, rear**

Roof Sprinklers Cut Heat Gain

. . . by 80 to 90 percent in new plant, reducing air conditioning capacity required and saving capital equipment and operating costs

THERMOSTAT SWITCH UNIT, set at 90 F, automatically controls water for each sprinkler section through a motor operated valve, background.

BY J. A. D'ENTREMONT
Chief of Maintenance
Rust Craft Publishers

and

M. BIGELOW MACPHERSON
Engineer
April Showers Co.

Evaporative cooling provided by a roof sprinkler system can "short-stop" 80 to 90 percent of the solar heat that would normally be absorbed by the roof and radiated down into a building.

The sprinkler system installed in over 100,000 sq ft of roof area of the new plant of Rust Craft Publishers, Dedham, Mass., was thus able to save 50 tons of air conditioning capacity. As a result, $25,000 was saved in capital equipment, plus $5000 annual operating costs of this equipment, calculated for the firm's air conditioning season of six months on a 24 hr basis.

The system at Rust Craft is divided into five independent sections, each section being automatically controlled by a plastic enclosed thermostat unit installed on the roof. The thermostats are set to turn on the sprinklers when the roof temperature reaches 90 F dry bulb and cut off the water supply when the temperature drops to 86 F.

The thermostatic controls are differential expansion type units constructed on the strut-and-tube principle.

The thermostats are positioned to receive the spray of a nearby nozzle so as to be exposed to the same temperature variations occurring on the roof. Water is used only when needed, and operating costs are kept low.

The sprinklers are at the corners of equilateral triangles with sides from 12 to 24 ft long.

The water is delivered to the roof through 3 in. inside mains which feed to 1½ in. distribution mains for each roof zone. Within each zone the water is distributed through a branching network of 1½ to ½ in. piping. The nozzles are elevated 8 in. off the roof.

The sprinkler water is obtained from the 550 gpm flow of waste condenser cooling water from the printing plant's 400 ton air conditioning system. Since the sprinkler system operates for a total of about 2 hr out of every 10 due to the thermostatic control, the major part of this cooling waste is pumped to a 1½ in. static roof pool on the center section of the manufacturing building. Both the sprinklers and roof pool are supplied from a common well water pumping system consisting of a 100 hp-550 gpm, and a 75 hp-300 gpm submersible pump. The system consumes about 150 gal per day per 1000 ft of roof surface.

TABLE 1—UNDER-ROOF TEMPERATURES are compared here with and without cooling at various sections of the Rust Craft plant

Location	Temperature, F
Roof surface	145
Under roof	
Warehouse section (no cooling)	104
1½ in. pool section	92
Sprinkler cooled section	80

The cooling efficiency of the sprinkler system and roof pool, contrasted with the uncooled warehouse section, as measured by under-roof temperatures in the Rust Craft building on a typical summer day is shown in Table 1. Roof construction consists of a tar and gravel outer surfacing.

Maintenance of the sprinkler system requires about two days during the six month operating season, mainly to drain the system before the advent of freezing temperatures. The distribution piping is pitched to facilitate drainage through valves at the low points.

Occasionally individual nozzles will become blocked by accumulated dirt carried by the condenser cooling water from the heat exchangers. Nozzles can be cleaned in about 30 sec by loosening the core and permitting line pressure to flush out the clogged jets. ⌗

Photo courtesy Thermoswitch Div., Fenwal, Inc.

ARI Show Features Air Conditioning

HERE ARE the names and booth numbers of the exhibitors (per latest advice at press-time from the exposition management) scheduled to show air conditioning equipment or products at the "10th Exposition—Air-Conditioning and Refrigeration Industry," sponsored by The Air-Conditioning and Refrigeration Institute at the International Amphitheatre, Chicago, November 18-21. The Sherman is the ARI's headquarters hotel.

Those listed with information on the products they will show and the names of personnel who will be in attendance furnished these details direct to the publisher. In addition to the exhibitors listed here, there are also some companies who will have displays of other than air conditioning equipment or products.

Heating, Piping & Air Conditioning will be on hand at the show in Booth 704.

ACME INDUSTRIES, INC., 600 N. Mechanic St., Jackson, Mich.—Booths 418, 420

In attendance: K. A. Weatherwax, P. A. Weatherwax, R. C. Robertson, E. B. Dunphy, W. M. Hassenplug, D. G. Merrill, W. C. Rehor, H. W. Smith.

Exhibiting: Packaged liquid chillers, cooling towers, air handlers, system components (condensers, chillers, etc). New "Flow-Cold" and "Flow-Mizer" cooling towers with "Acme-Pak" plastic deck, and engineering improvements in packaged chiller line will be featured.

ADDISON PRODUCTS CO., Addison, Mich.—Booths 611, 612

In attendance: Harmon Rouliffson, W. A. Hames, L. G. Underhill.

Exhibiting: 2 hp and 3½ hp air cooled packages; split systems, air cooled, 2, 3, 3½ and 5 hp; dehumidifiers; window type units. Small portable room cooler will be featured.

AEROQUIP CORP., 300 S. East St., Jackson, Mich.—Booth 641

In attendance: M. L. Jones, A. Lane, W. F. Rogge.

Exhibiting: Flexible hose for "Freon," with detachable re-usable fittings; self-sealing couplings for "Freon" lines. New and improved self-sealing coupling for "Freon" and a special plastic working model of this coupling will be featured.

AEROVOX CORP., 740 Belleville Ave., New Bedford, Mass.—Booth 745

In attendance: P. M. Beard, F. Campisano, R. R. Warriner, G. R. Tinay.

Exhibiting: Motor-start and motor-run capacitors, featuring new developments and special types of AC capacitors.

AIRSERCO MFG. CO., 435 Melwood St., Pittsburgh 13, Pa.—Booth 146

AIRTEMP DIV., CHRYSLER CORP., 1600 Webster St., Dayton 1, Ohio—Booths 105, 106, 107, 108, 109, 110

In attendance: C. E. Buchholzer, R. J. Schumann, J. F. Knoff, M. B. Smith, M. T. Bard, J. A. Clarke, L. E. Epley, M. A. Morris, H. A. Dillon, W. H. Denton, H. D. Day, Jr., R. A. Gonzalez, P. W. Wyckoff, R. L. Lovelace, R. F. Ransom, J. L. McGarry.

Exhibiting: Residential and commercial air conditioning products; new air cooled commercial packaged air conditioners in sizes from 10 to 30 hp; winter air conditioners; 1958 room air conditioner models; year 'round home air conditioning systems; commercial and industrial air conditioners. New line of furnaces will be unveiled.

ALCO VALVE CO., 865 Kingsland Ave., St. Louis 5, Mo.—Booth 444

ALLEN-BRADLEY CO., 136 W. Greenfield Ave., Milwaukee 4, Wisc.—Booths 767, 768

Exhibiting: Motor control. New developments in pushbuttons will be featured.

ALLIED CHEMICAL & DYE CORP. — see GENERAL CHEMICAL DIV.

ALLIN MFG. CO., 410 Hermitage Ave., Chicago 22, Ill. — Booth 662

ALTER CO., INC., THE HARRY, 1721 S. Wabash Ave., Chicago 16, Ill.—Booth 713

In attendance: Irving Alter, Joe Novotny, Fil Weinstein, Warren Kahn, Harry Alter, James Alter, Ted Robateau, Jack Carava.

AMERICAN BRASS CO., THE, Waterbury, Conn.—Booth 521

In attendance: F. H. Ballantyne, A. B. Freeman, C. E. Woodward, M. B. Allan, F. W. Green, J. L. Marvin, W. B. Hammond.

Exhibiting: Copper refrigeration tube in long length coils; capillary tube; restrictor tube; bulb and capillary parts; "Teflon" flexible connectors; "Sealtite" flexible liquid-tight electrical conduit; "American" vibration eliminators; flexible connectors for pull-out units; flexible stainless steel conduit; "Flexpipe" flexible bronze connectors; flexible metal ducting.

AMERICAN COILS CO., Route 524, Farmingdale, N. J.—Booths 663, 664, 665

In attendance: M. Parcaro, J. Kirk, L. Meringolo, Pete Hatcher, F. Riedel.

Exhibiting: Air conditioners, 3 to 15 hp, store type, water cooled; heat pumps, water to air, 3 to 15 hp; packaged chillers, water cooled, 3 to 15 hp; packaged chillers, air cooled, 2 to 15 hp; air conditioners, air cooled, 3 to 15 hp; air conditioners, ceiling mounted, 2, 3, 5, 7½ hp; remote ceiling mounted units, 2, 3, 5, 7½ hp; air cooled condensers 3, 5, 7½ hp; cooling towers, 3 to 60 tons; air cooled condensing units, 3 to 15 hp; water cooled condensing units, 3 to 15 hp. Stress will be on air cooled and expanded product line, including air cooled air conditioners, air cooled chillers, air cooled condensing units with cabinet, water cooled condensing units, air cooled condensers.

AMERICAN METAL HOSE DIV.—see AMERICAN BRASS CO., THE

AMERICAN MOTORS CORP. — see KELVINATOR DIV.

AMERICAN NAME PLATE & MFG. CO., 4254 W. Arthington St., Chicago 24, Ill.—Booth 223

In attendance: C. H. Johns, G. T. Bunker, Jr., E. G. Blake, E. F. Pulte, R. A. Wittmann, N. J. Wagner.

Exhibiting: Name-plates, panels, etc. for air conditioner manufacturers.

AMERICAN PLATINUM WORKS, THE, 231 New Jersey Railroad Ave., Newark 5, N. J. —Booth 744

In attendance: Joseph Nickerson, Herschel R. Cole, Leo J. Radak, A. Stanley Cross, L. J. Sebo, I. J. Eales, Roy Pagni, H. Hermanek, H. Feil.

Exhibiting: Silver brazing alloys and fluxes for manufacturing and installing air conditioning equipment.

AMERICAN RADIATOR & STANDARD SANITARY CORP. — see DETROIT CONTROLS DIV.

AMINCO REFRIGERATION PRODUCTS CO., 1000 E. McNichols Rd., Detroit 3, Mich.—Booth 207

In attendance: Edward Kellie, J. L. Trix.

Exhibiting: Oil separators. Discharge line mufflers will be featured.

ANDERSON CHEMICAL CO., P. O., Box 1424, Macon, Ga.—Booth 605

ANSUL CHEMICAL CO., 1 Stanton St., Marinette, Wisc.—Booth 449

In attendance: L. C. McKesson, H. C. Higley, John Bopp, E. M. Billings, Ed Beacham, B. J. Sebstad, George Vermilye.

Exhibiting: "Super Dry-Eye" moisture indicator and sight glass, "T-Flo" drier manifold, "T-Flo" receiver drier, "T-Flo" refrigeration drier, oil, "Freon." The moisture indicator and sight glass and the drier manifold and receiver drier will be featured.

ARMSTRONG CORK CO., Lancaster, Pa.—Booth 163

In attendance: M. F. Kottmeier, W. F. North, A. B. Condon, C. W. Gundlach, F. F. Hauser, D. R. Herb, J. B. Nelson, W. C. Ryckman, W. J. Flueck, E. H. Schulz.

Exhibiting: "Armaflex" foamed plastic pipe insulation.

ARROW-HART & HEGEMAN ELECTRIC CO., 103 Hawthorn St., Hartford, Conn.—Booth 232

In attendance: T. Hutchinson, J. Rainey, D. Reynolds, G. Heiden.

Exhibiting: 20-25 amp relays, 10 amp relays, 30 and 50 amp specific purpose contactors and starters, reduced voltage starters for air conditioning applications, industrial starters and contactors to 200 hp. New 20 and 25 amp relays, and new 50 amp starters and contactors, will be featured.

BACHARACH INDUSTRIAL INSTRUMENT CO., 200 N. Braddock Ave., Pittsburgh 8, Pa.—Booth 222

In attendance: Rudolf Ulrich, John W. Smith, J. V. Palmer, J. A. Stein.

Exhibiting: Sling psychrometer, "Florite" air velocity meters, temperature recorders, filter gages. Scoop-type air velocity meter and remote reading temperature recorder will be featured.

BALTIMORE AIRCOIL CO., INC., P. O. Box 7322, Baltimore 27, Md.—Booths 648, 649, 650

In attendance: John Engalitcheff, Jr., R. R. Forseille, W. E. Kahlert, Hugh B. Shepard, T. F. Facius, L. W. Bookhultz, George E. Klein, Carl G. Schroeder.

Exhibiting: Centrifugal fan evaporative condensers and cooling towers in both the blow-through and draw-through style. New propeller line of evaporative condensers and cooling towers, "for applications where minimum horsepower is essential," the fans located in the dry entering air, will be featured.

BELL & GOSSETT CO., 8200 N. Austin Ave., Morton Grove, Ill.—Booths 525, 526

In attendance: E. J. Gossett, C. E. Pullum, R. E. Moore, W. A. Boone, H. R. Henke, M.

H. Hofmeister, Frank Gall, C. Towns, A. B. Meeg.

Exhibiting: Circulating pumps for hot and chilled water systems, cooling towers, etc.; refrigeration components, such as condensers, evaporators, heat exchangers, etc.; packaged liquid chillers. A 40 ton "B & G" package chiller will be on display featuring all "B & G" components, pumps, compressors, motor, and electrical system. Highlighting the display will be a new reciprocating compressor and motor.

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE CO., EVANSVILLE DIV., 950 E. Virginia, Evansville 11, Ind.—Booth 414

In attendance: John R. Morrill, Donald J. Wood, C. E. Ploeger, John W. Downen; H. C. Preher, J. N. Schnur, W. F. Cissell, D. J. Miller.

Exhibiting: Steel welded hermetic condensing units, ¼ hp through 2 hp. Two pole, 3500 rpm motor-compressors, and integral horsepower condensing units, 2 hp through 7½ hp, in cast case and of semi-hermetic design, will be featured.

BETZ DIV.—see BOHN ALUMINUM & BRASS CORP.

BINKS MFG. CO., 3100 Carroll Ave., Chicago 12, Ill.—Booths 230, 231

In attendance: C. R. Kranz, A. G. Stacy, James Doherty, R. J. Plutz, John E. Miller.

Exhibiting: New "Watertemp" cooling towers, "featuring hot dipped galvanized construction throughout," and supplied in frame sizes from 5 to 60 tons of refrigeration.

BOHN ALUMINUM & BRASS CORP., BETZ DIV., 1625 E. Voorhees, Danville, Ill.—Booth 359

In attendance: H. Blake Thomas, W. H. Markson, F. F. Altman.

Exhibiting: Unit coolers and defrost system. Air cooled condenser with "Sensitizer" for year 'round control and fan-coil unit for ceiling mounting will be featured.

BROOKSIDE CORP., P. O. Box 38, McCordsville, Ind.—Booth 428

In attendance: Claude A. Forth, Sr., Claude A. Forth, Jr., J. Wooden and others from sales offices.

Exhibiting: Propeller and centrifugal fans for air conditioning, new designs being featured.

BRUNNER CO. SUBSIDIARY—see DUNHAM-BUSH, INC.

BRUNNER DIV.—see DUNHAM-BUSH, INC.

BRYANT MFG. CO., 2020 Montcalm St., Indianapolis 7, Ind.—Booth 409

In attendance: H. L. Clary, M. J. Fortier, Roy C. East, R. A. Hamilton, C. R. Eskew, J. A. Mekel.

Exhibiting: Air cooled condensing unit, evaporator coil, heating-cooling unit. New combination heating and cooling unit with built-in air cooled condenser, and application information on air cooled equipment, will be featured.

BUNDY TUBING CO., 8109 E. Jefferson, Detroit 14, Mich.—Booth 545

BURR OAK TOOL & GAUGE CO., 1009 Prairie Ave., Sturgis, Mich.—Booth 523

In attendance: N. A. Franks, E. E. Eldridge, R. A. Pierce, E. Pursel.

Exhibiting: High production automatic return bender producing return bends for air conditioning and heating coils.

BYERS CO., A. M., 1810 Clark Bldg., Pittsburgh 22, Pa.—Booth 711

In attendance: G. B. Coffey, R. I. Enzian, H. R. Rowland, E. A. Luebbe, T. W. Hogan.

Exhibiting: Wrought iron pipe and nipples.

CALGON CO., 323 4th Ave., Pittsburgh, Pa.—Booth 226

In attendance: C. L. Barksdale, John Crane, Hal Kivlan, Larry Connolly, Dean Gumble, Ed Mohney, Bob Baker.

Exhibiting: Cooling water treatment products. An "atomic" exhibit using Geiger counter to demonstrate effectiveness of "Micromet" plates in preventing scale build-up in condenser tubes will be featured.

CARRIER CORP., 300 S. Geddes St., Syracuse 1, N. Y.—Booth 510

In attendance: Wm. Bodinus, D. Arnold.

CARVER PUMP CO., 1056 Hershey Ave., Muscatine, Iowa—Booth 145

In attendance: William A. McMahan, B. D. Foley, W. W. Webber.

Exhibiting: Centrifugal pumps.

CENTURY ELECTRIC CO., 1806 Pine St., St. Louis 3, Mo.—Booth 625

In attendance: W. Wetlaufer, R. Biller, R. Moseman, W. Nace, P. Williams, L. Downing, J. Smith, K. Fischer, W. Helm, L. Hodges, H. Roberts, F. Nutt, V. Hartling, G. Nafe.

Exhibiting: Electric motors, both fractional horsepower and integral horsepower, for all types of drives. Sleeve bearing for any-angle mounting will be featured.

CERRO DE PASCO CORP.—see LEWIN-MATHES CO.

CHASE BRASS & COPPER CO., 236 Grand St., Waterbury 20, Conn.—Booth 562

In attendance: Paul M. Thomas, Wallace L. Brown, Walter E. Evans, John M. Gehl, Jr., E. J. Malvey, Walter C. Gram, Allan R. Armstrong, Charles E. Festge, Robert Chittim.

Exhibiting: Copper tube for air conditioning, copper water tube, fittings, brass mill products. New disposal reel will be featured.

CHEMICAL SOLVENT CO., P. O. Box 487, Birmingham, Ala.—Booth 263

In attendance: N. A. Burkey, Jr., Mrs. Olivia P. Burkey, R. A. Wolfe, Roy McCrady, W. J. McKeough, Frank N. Moss, Norman K. Porter, T. L. Smith, Jr., R. D. Morrow, Merle G. Haynes.

Exhibiting: "Ultra Solvex", regular "Solvex" cleaner, "Solvex" maintenance, "Solvex" algae control.

CHRYSLER CORP.—see AIRTEMP DIV.

COBRA METAL HOSE, 4640 W. 54th St., Chicago 32, Ill.—Booth 720

In attendance: Clyde D. Greeno, Herbert N. Woodward, Victor Sipovic.

Exhibiting: Noise and vibration absorbers, flexible nipples, pump connectors, "Freon" hose lines, compressor line assemblies. Merchandising cataloging procedure simplifying selection and ordering will be featured.

COLEMAN CO., INC., THE, 250 N. St. Francis, Wichita 1, Kans.—Booth 320

In attendance: A. B. Newton, Frank Osborne, A. E. Castello, L. Chaplin, J. E. Miller.

Exhibiting: 2 hp "Polar-Pak" waterless central cooling unit for homes.

CONTROLS CO. OF AMERICA, 2450 N. 32nd, Milwaukee 45, Wisc.—Booths 310, 311

In attendance: A. Topp, D. Albright, T. Melville, H. Michalski, I. Finkler, D. Henderson, J. Hall, D. Tmey.

Exhibiting: Valves, filters and driers. Automotive air conditioning applications, new solenoid valves, and automatic expansion valves will be featured.

COPELAND REFRIGERATION CORP., Sidney, Ohio.—Booths 118, 119, 120, 121, 122

In attendance: F. J. Gleason, W. G. von Meyer, R. G. Berg, J. E. Barker, G. E. Detrick, R. G. Mozley, and all field representatives.

Exhibiting: "Copelametic" condensing units and motor-compressors; "Copelaweld" motor-compressors, belt-driven; condensing units and compressors.

CREAMERY PACKAGE MFG. CO., THE, 1243 W. Washington Blvd., Chicago 3, Ill.—Booth 513

In attendance: R. Bell, J. L. Brazee, O. P. Heller, H. Hess, F. B. Hohenhorst, F. G. Jones, H. J. Kerr, W. Kampman, E. B. Lehrack, W. O. Whitney.

Exhibiting: Cutaway ammonia compressor, modular construction compressor.

CURTIS MFG. CO., 1905 Kienlen Ave., St. Louis 20, Mo.—Booths 559, 607

In attendance: Harry C. Morrison, Harry J. Nettler, Andrew M. Bono, K. T. Rockey, Frank J. Hanley, Robert J. Allen.

Exhibiting: Packaged liquid chiller, packaged air conditioners, air cooled condensing unit, condensing units. Redesigned liquid chiller and new style 1958 packaged air conditioners and air cooled condensing unit will be featured.

CUTLER-HAMMER, INC., 315 N. 12th St., Milwaukee 1, Wisc.—Booth 430

DAVISON CHEMICAL CO., DIV. OF W. R. GRACE & CO., 101 N. Charles St., Baltimore 2, Md.—Booth 364

In attendance: A. R. Worrall, C. E. Meginnis, R. H. Herrmann, J. F. Quinn, E. K. Ruble.

Exhibiting: Silica gel desiccant.

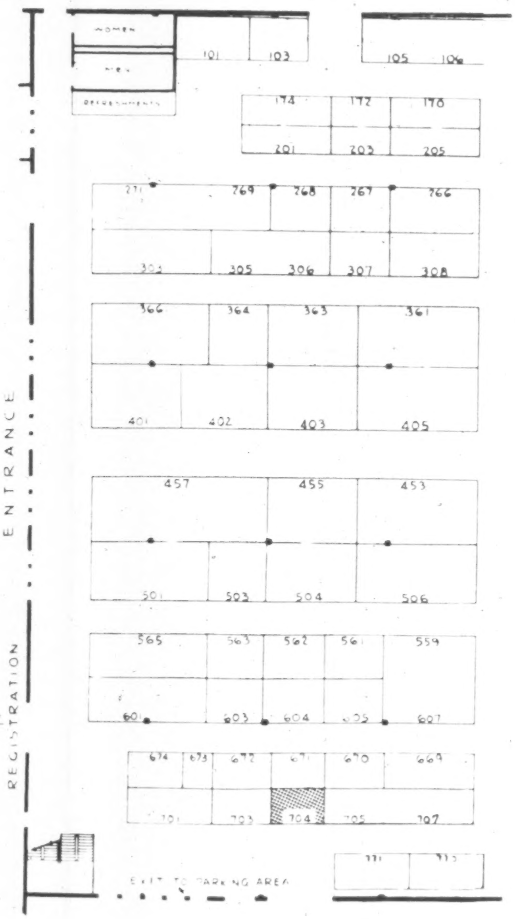
DELCO PRODUCTS DIV., GENERAL MOTORS CORP., 329 E. First St., Dayton 1, Ohio—Booth 448

In attendance: M. E. Rasper, R. O. Dehlendorf, R. R. Pees, J. F. Howe, J. D. Hughes, P. I. Bland, W. A. Calvert, C. L. Holverstott,

Chicago Scene of Several Meetings in November

Dates	*Association or Society*	*Hotel*
14-16	The American Society of Refrigerating Engineers	Shoreland
16-18	Air Conditioning and Refrigeration Wholesalers Association	Morrison
16-19	Refrigeration Service Engineers Society	Morrison
18-19	Refrigeration and Air Conditioning Contractors Association	Drake
18-20	National Heating and Airconditioning Wholesalers	Morrison
18-21	National Association of Practical Refrigerating Engineers	Del Prado
21-22	National Warm Air Heating and Air Conditioning Association	Morrison

'What to see and where to see it' at the Exposition is given in the accompanying listings. For further information, you are invited to inquire at HPAC's booth, No. 704. The show will be open Monday, November 18, from 2 p.m. to 10 p.m.; Tuesday and Wednesday, November 19 and 20, from 10 a.m. to 6 p.m.; and on Thursday, November 21, from 10 a.m. to 4 p.m. The general public will be admitted on Thursday.



H. E. Weisenborn, C. B. Lee, J. F. Rutter, E. J. Boyer, R. C. Anderson, J. W. Brumley, O. G. Saettle.

Exhibiting: Electric motors — shaded pole and permanent split capacitor motors for air moving applications, split phase and capacitor start F.H.P. motors, single phase and three phase integral H.P. motors, gear motors, hermetic motors, capacitors, relays and contactors.

DETROIT CONTROLS DIV., AMERICAN RADIATOR & STANDARD SANITARY CORP., 5900 Trumbull Ave., Detroit 8, Mich.—Booths 557, 609

In attendance: C. H. Hodges, E. J. Doucet, F. G. Coggin, K. B. Thorndike, F. Y. Carter C. U. Cole, T. C. McKee, D. J. Gott, E. E. Crowley, S. E. Leinwand, G. A. Phillips, P. D. Sinclair, J. M. Strauss, W. Stafford, R. S. Paltz, M. D. Hagen, F. T. Sherman, M. Kronn, C. Klopp, L. Szerecsen, D. R. Sallman, H. E. Lyons, C. T. Magill, H. C. Smith.

Exhibiting: "Selectaflow" valves and electrical control systems for combination heating and air conditioning jobs. New line of thermostatic expansion valves will be featured.

DOLE REFRIGERATING CO., 5910 N. Pulaski Rd., Chicago 30, Ill.—Booth 366

In attendance: H. P. Hansen, O. L. Rose, J. E. Hutchinson, B. P. Tweed, W. C. Mueller, W. E. Lauterbach, C. C. Ryan, H. DeBaugh.

Exhibiting: "Ice-Cel" latent heat ice storage system for air conditioning.

DOW CHEMICAL CO., Midland, Mich.—Booth 756

In attendance: Don M. Guthrie, H. W. Hunter, C. S. Armstrong, W. S. Schock, E. W. Rogers.

DUNHAM-BUSH, INC., 179 South St., West Hartford 10, Conn.—Booths 346 through 352

In attendance: Cecil Boling, James Mulcahey, Walter Browning, Alan Decker, Perley Barker, A. Zumbrum, Sr., Wallace Hoeing, Paul Hunker, Robert Lennox, C. Kimmel, P. Thayer, R. Comstock, and district managers and sales representatives.

Exhibiting: Multizone units, air conditioning coils, comfort conditioner units, year 'round room air conditioners, commercial package units, package chillers, open type condensing units, "Brunner Metic" condensing units. Remote between the studs air conditioner and 5 and 7 hp condensing units will be featured.

duPONT de NEMOURS & CO., INC., E. I., 1007 Market St., Wilmington 98, Dela.—Booth 402

In attendance: R. J. Thompson, W. A. Bours, III, T. D. Johnson, Jr., D. C. McSorley, J. C. Hoopes, R. L. Williams, S. N. Seely, S. L. Richardson, N. W. Kent, Charles Wirth, III, G. G. Pearce, H. L. Beavers, W. H. Brown, Jr., J. K. Worthington, J. B. Gray, D. E. Kvalnes, A. E. Fulford, J. G. Gordon, III, D. W. Nesbit, Jr.

Exhibiting: "Freon" refrigerants. The story of refrigerants and air conditioning from prehistoric days until modern times will be featured in shadow box displays and live demonstrations, with special acts to show the safety and cooling characteristics of "Freon."

DURO-DYNE CORP., 800 Third Ave., New Hyde Park, Long Island, N. Y.—Booth 330

In attendance: Milton Hinden, Charles J. McDermott, R. Wendell Franks.

Exhibiting: Duct tapes for sealing ducts and insulation, insulation adhesive, flexible duct connectors, turning vane rail, damper regulators and quadrants, multi-blade damper hardware.

DWYER MFG. CO., F. W., P. O. Box 373, Michigan City, Ind.—Booth 331

In attendance: J. G. Dwyer, P. W. Dwyer.

Exhibiting: Instruments — air filter gages, air meters, manometers, pitot tubes, draft gages, pressure switches, etc. Air meter and air filter gage will be featured.

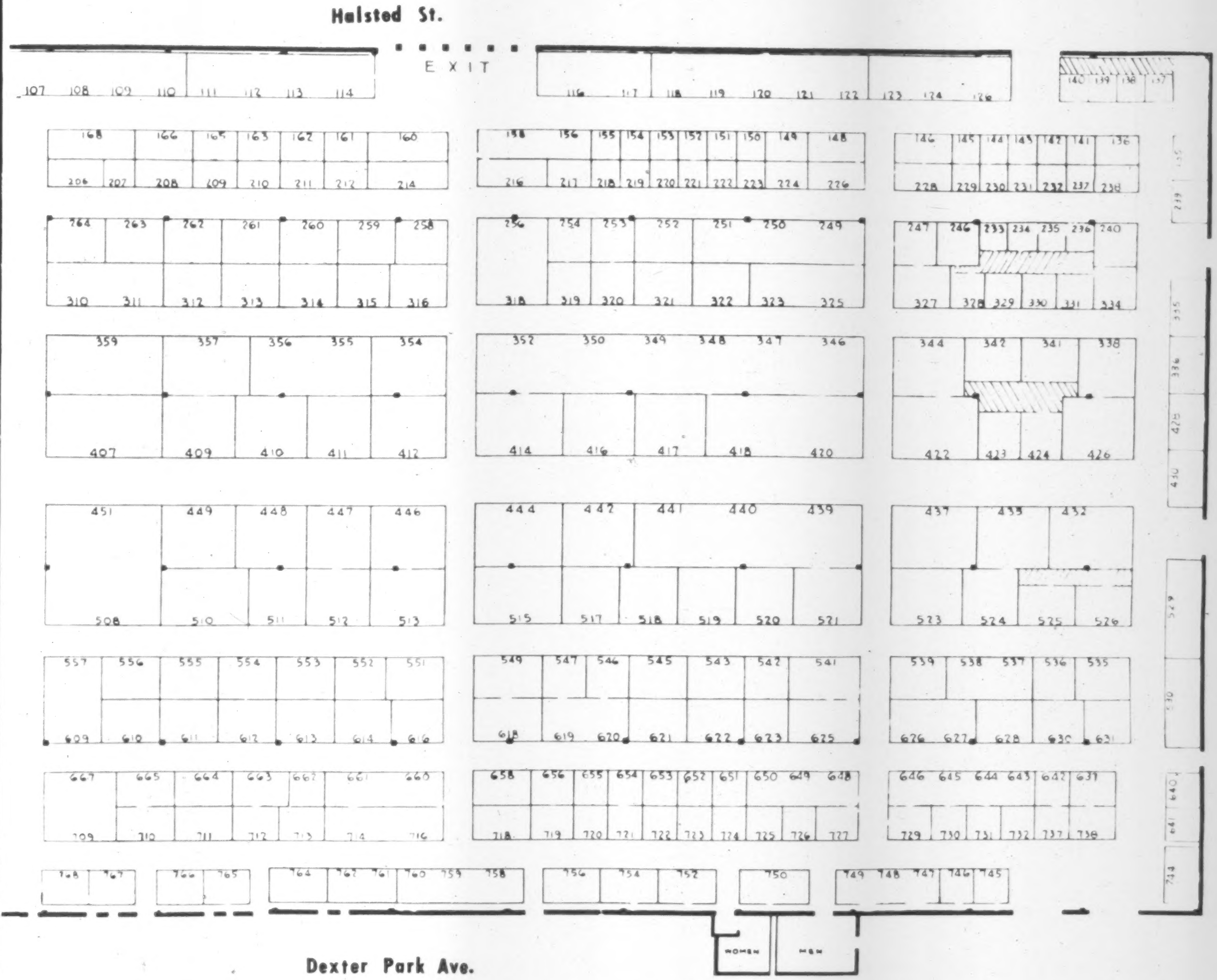
ELECTRIC AUTO-LITE CO., THE, INDUSTRIAL THERMOMETER DIV., 1201 Champlain St., Toledo 1, Ohio—Booth 674

In attendance: L. B. Murphy, R. R. Hopkins, Thomas Murchie, Leo Kubiak.

Exhibiting: Dial indicating thermometers, recording thermometers, recording vacuum gages, recording pressure gages, recording compound gages. New inkless recording thermometer will be featured.

ELECTRO DYNAMIC DIV., GENERAL DYNAMICS CORP., 163 Ave. A, Bayonne, N. J.—Booths 233, 234

In attendance: Dean W. Paul, W. L. Pharmer, George Douglass.



Exhibiting: Integral horsepower motors for air conditioning field.

ELKHART PRODUCTS CORP., 1255 Oak St., Elkhart, Ind.—Booth 731

EMERSON ELECTRIC MFG. CO., THE, 8100 Florissant Ave., St. Louis 21, Mo.—Booths 660, 661

In attendance: C. A. Swanlund, F. C. Weaver, L. L. Schneider, J. A. Basten, O. D. Metz, E. R. Krueger, L. Jenning, A. C. Dickson, W. H. Thias, C. H. Dederick, E. K. Handlan, L. J. Klantzer.

Exhibiting: Electric motors for room air conditioners, including new "Thin Model" shaded pole and permanent split capacitor types; electric motors for oil burners, including new compact 1/8 hp model weighing 1½ lb less than former type and also available in 1/6 hp and larger sizes; new "Northwind" room air conditioners featuring "high capacity, compact size, and improved air distribution pattern," plus special models in the low-ampere category.

EMERSON-QUIET KOOL, 46 Oliver St., Newark, N. J.—Booth 442

ESSEX WIRE CORP.—see RBM DIV.

EVIS MFG. CO., 5955 N. Rockwell St., Chicago 45, Ill.—Booth 252

Exhibiting: Water and fuel oil conditioners.

F5 AIR CONDITIONING CORP., 1815 S. Maybelle, Box 9355, Tulsa 7, Okla.—Booth 315

In attendance: L. W. Griffith, W. F. Matheny, Jr.

Exhibiting: New 3 ton semi-package cooler, 5 ton "Fandaire" air cooled condenser, 30 ton "Fandaire" air cooled condenser.

FAFNIR BEARING CO., THE, 37 Booth St., New Britain, Conn.—Booth 261

In attendance: H. C. King, R. E. Downs, G. D. Spitler, R. F. Steeneck, W. S. Ames, N. B. Bagger.

Exhibiting: Ball bearings and ball bearing power transmission units for air conditioning and air handling equipment.

FASCO INDUSTRIES, INC., 255 N. Union St., Rochester 2, N. Y.—Booth 554

In attendance: H. M. Sylvester, Sr., H. M. Sylvester, Jr., D. R. Schroedel, C. A. Button, R. W. Gysel, W. F. Purves, B. F. Kirby, J. M. Nolan, P. R. Reid, R. E. Waffle, D. G. Matthews, E. J. Dworetzky, W. A. MacDougall, L. P. Doty, Jr., W. N. Agnew, P. M. Mock.

Exhibiting: Shaded pole and permanent split capacitor motors.

FLEXIBLE TUBING CORP., Guilford, Conn. —Booth 511

In attendance: Frederick K. Daggett, Howard W. James, Wesley L. Guiles, William A. Butler, Richard B. Connell, Stephen K. Hawkins.

Exhibiting: "Thermaflex" flexible ducting for connections between main ducts, and sound boxes and diffusers, in both high and low pressure air conditioning systems, available in diameters of 2 to 12 in.; "Flex-Vent" venting kits for outdoor venting of automatic clothes dryers, removing heat and moisture; reinforced fabric ductings for air handling, fume removal, dust removal, and materials handling.

FRANKELL MFG. CO., INC., 1074 Home St., New York 59, N. Y.—Booth 165

In attendance: Frank Lowitz, Philip Nast, Benj. Saydman.

Exhibiting Hermetic compressor opener "to automatically open any shape hermetic compressor up to 20 in. diameter regardless of position of the weld."

FRICK CO., Waynesboro, Pa.—Booth 314

Exhibiting: Cut-away "Eclipse" compressor, kept in slow motion by a special drive, to illustrate line of multi-cylinder refrigerating machines built with two, three, four, six or nine cylinders, and available "for handling any standard refrigerant at any temperature on any commercial or industrial load." A special evaporative condenser, "with the fan placed at one side to save headroom," and a new 5 hp unit air conditioner will be featured. Models of "Prestfin" pipe coils and spiral finned pipe, along with a display of valves and fittings, machine parts, controls, and safety devices will be shown.

FRIGIDAIRE DIV. of GENERAL MOTORS, Dayton 1, Ohio—Booths 758, 759, 760

In attendance: Byron C. Wagner, W. H. Winn, R. A. Kramer, F. B. Hartney, Jr., R. S. McCool.

Exhibiting: Gas and oil-fired furnaces hooked up with cooling coils for year 'round heating and cooling, cooling coils, condensing units, coil blower, "Master-Matic" store air conditioner, room air conditioners. New 1958 room air conditioners will be featured.

FURNAS ELECTRIC CO., 1000 McKee St., Batavia, Ill.—Booth 654

In attendance: W. C. Furnas, W. F. Lisman, W. A. Meyer, J. B. Blass, J. O'Rourke, R. E. Baur, C. F. Witschonke.

Exhibiting: Electric motor controls. New small magnetic contactors rated 20, 30, 35 and 50 amp for across the line starting of hermetic and general purpose motors; increment starters rated through 200 hp; reduced voltage starter accessory for single phase 3 and 5 hp; and panels for special applications will be featured.

GARMAN CO., INC., 1253 Grover Rd., St. Louis 23, Mo.—Booth 724

In attendance: Arthur D. Berryman, Charles Elbreder.

Exhibiting: "Vapco" scale remover (cleaner), "Vapco-Phos" nuggets (preventive), "Vapco Slime-x," "Pump-Aid." New acid inhibitor additive "which permits use of strong, quick acting, low cost acids for scale removal without danger to metal surfaces," known as "Vapco-Hib," will be featured.

GENERAL AIR CONDITIONING CORP., 4542 E. Dunham St., Los Angeles, 23, Calif. —Booth 266

In attendance: J. E. Kercheval, J. L. Paulus.

Exhibiting: 2, 3, 5, and 10 ton package and remote air conditioners, also free-standing and with and without heat pumps and with and without humidifier.

GENERAL CHEMICAL DIV., ALLIED CHEMICAL & DYE CORP., 40 Rector St., New York 6, N. Y.—Booth 437

In attendance: L. D. Callans, H. L. Robbins, J. J. Tomlinson, H. C. Burki, E. V. Dunbar, George Dunbar, and regional salesmen.

Exhibiting: "Genetron Super-Dry" refrigerants 11, 12, 22, 113, 114a.

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif.—Booths 626, 627

In attendance: Doug Sterner, Fred Weldon, Jack Ray, Bud Lerch, Jack Croushore, Lee Liepin, Ray Wheeler, Mal Johnson.

Exhibiting: Air conditioning thermostats, solenoid valves, motor operated valves, thermostatic expansion valves, master control relay panels, damper motors, control accessories (motor starters, relays, strainers, time switches). New air conditioning day-night clock thermostat will be featured.

GENERAL DYNAMICS CORP.—see ELECTRO DYNAMIC DIV.

GENERAL ELECTRIC CO., AIR CONDITIONING DIV., 5 Lawrence St., Bloomfield, N. J.—Booth 515

In attendance: R. H. Jones, H. N. McMemimen, R. K. Miller, L. H. Hirschbach, C. B. Ramsdell, W. F. R. Karsten.

Exhibiting: For residential or commercial use, new "split systems" with remote condensing units in 3, 4, and 5 ton capacities with evaporator-blower units suitable for mounting within or outside of conditioned space; new packaged water cooled air conditioners in 20, 25 and 30 ton capacities for commercial and industrial applications.

GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y.—Booths 111, 112, 113, 114

In attendance: D. C. Hanson, O. M. Raith, D. G. Cochran, R. C. Oliver, D. R. Antrim, R. E. Wiles, R. F. Robinson, M. E. Evans, G. C. Wedel, C. W. Seyboldt, A. J. Krystofic, N. T. Horton, A. I. Martin, J. G. Smaxwell, R. D. Larson, J. W. Hinchliffe, C. Harris, F. W. Reynolds, J. B. Maher, R. H. Kimball, N. H. Barker, G. T. Shannon, N. R. Clark, L. E. Gregory.

Exhibiting: Low and high speed hermetic motor parts, up to 7 in. outer diameter for air conditioning compressor applications; shaded pole and permanent split capacitor motors; full acceleration part-winding start control; halogen type leak detectors, halogen leak standard, and helium type mass spectrometer; oval and rectangular capacitors for air conditioners. New design shaded pole and permanent split capacitor motors will be featured.

GENERAL MOTORS CORP., DELCO PRODUCTS DIV., 329 E. First St., Dayton 1, Ohio —Booth 448

GENERAL MOTORS CORP.—also see FRIGIDAIRE DIV.

GENERAL PLATE DIV. — see METALS & CONTROLS CORP.

GOODFELLOW CO., INC., E. D., 496 E. Bodley Ave., Memphis 6, Tenn.—Booth 616

In attendance: E. D. Goodfellow, Chas. Crain, C. E. Goodfellow.

Exhibiting: Cooling towers and centrifugal pumps. New tower designs will be featured.

GRACE & CO., W. R.—see DAVISON CHEMICAL CO.

GREAT AMERICAN INDUSTRIES, INC.—see RUBATEX DIV.

HALSTEAD & MITCHELL, 705 Bessemer Bldg., Pittsburgh 22, Pa.—Booth 335

In attendance: H. I. Schmidt, William E. Rapp, Byron Halstead, Robert M. Nelson, Harry R. Smith, William D. Moffitt.

Exhibiting: Air cooled condensers, water cooled condensers, finned coils, cooling towers. Air cooled condenser for all-weather operation, and "Limitrol" valve hooked up with compressor and evaporator will be featured.

HEAT-X SUBSIDIARY—see DUNHAM-BUSH, INC.

HENRY VALVE CO., 3215 North Ave., Melrose Park, Ill.—Booth 669

H & H TUBE & MFG. CO., 263 N. Forman Ave., Detroit 17, Mich.—Booth 258

In attendance: Jack Couzens, H. A. MacKenzie, R. W. Baggott, R. E. Anderson, Jack Wirtanen, D. A. Harston, D. T., Applebee, Nels Johnson, W. A. Macristy, John Renstrom, Wm. Pearson, Chas. Funk.

Exhibiting: Copper tubing, fabricated parts of copper tubing, special shapes in tubing, copper coils, and straight lengths.

HIGHSIDE CHEMICALS, INC., 10 Colfax Ave., Clifton, N. J.—Booth 623

In attendance: Albert R. Shelby, John F. Post.

Exhibiting: "Thawzone" fluid dehydrant, "Trace" liquid leak detector, "Leak Lock" pipe joint sealing compound.

HOLSCLAW BROS., INC., 408 N. Willow Rd., Evansville, Ind.—Booth 220

In attendance: C. H. Holsclaw, G. A. Maes, Roy Elfreich.

Exhibiting: "Handy" tube benders for tubing and pipe. New packaging for tube benders will be featured.

HOWE ICE MACHINE CO., 2825 Montrose, Chicago 18, Ill.—Booth 710

In attendance: H. B. Howe, Dick Howe, Bob Howe, Roger Hart, Stanley Reid.

Exhibiting: 20 ton compressor assembly, shell and tube condenser, intercooler.

HUCK MFG. CO., 2480 Bellevue Ave., Detroit 7, Mich.—Booth 412

In attendance: George Q. Mathews, William D. Messer, Allen R. Tenny, Robert Powell, William Givler, Robert Butt, Norman Miller, Fred Rufi.

Exhibiting: Power pack for driving any combination of two of the manufacturer's standard hydraulic tools and power pack for driving any combination of four of the manufacturer's standard hydraulic tools, for use with existing and new hydraulic industrial tooling. Commercial "Huckbolt" fastener, "Daisy" and other blind rivets, driving tools and other fasteners will be featured.

HUPP CORP.—see PERFECTION INDUSTRIES and TYPHOON AIR CONDITIONING CO.

IMPERIAL BRASS MFG. CO., THE, 1200 W. Harrison St., Chicago 7, Ill.—Booth 205

In attendance: F. C. Shafer, W. C. Musham, C. H. Benson, G. J. Duerr, T. A. Byrnes, G. E. Franck, E. F. Todd, M. L. Warder, T. A. Fuite, H. T. McNellis, C. O. Engels.

Exhibiting: "Triple Seal" flared tube fittings, "Torpedo" driers and filters, liquid indicators, shut-off valves, "Golden Torpedo" filter-driers, brass pipe fittings, hermetic piercing valve, saddle valve, tube cutters, test plugs, flaring tools, refacing tools, tube benders, tube reamers, charging and testing units, charging lines, pinch-off tools, flywheel puller, refrigerant dispensing valves. New residential air conditioning tool kit, new automotive air conditioning tool kit, new "Imperial Diamond" valves in 3-way and angle types, and various new tools will be featured.

JACKES-EVANS MFG. CO., CONTROLS DIV., 4427 Geraldine Ave., St. Louis, 15, Mo.—Booth 259

In attendance: Stanley F. Jackes, A. M. Cornwell, John H. Marling, and field engineers and representatives.

Exhibiting: New three-way solenoid valve for control of water flow through fan-coil units for year 'round air conditioning.

JARROW PRODUCTS, INC., 420 N. La Salle St., Chicago 10, Ill.—Booth 238

In attendance: Stanley L. Jarrow, Myles A. Jarrow, Richard Nosek, Angelo Monti, Sidney L. Wein.

Exhibiting: "Condenseal" closed cell sponge tubing for insulation on hot and cold lines will be among the products shown.

KECO INDUSTRIES, INC., 2438 Beekman St., Cincinnati 14, Ohio — Booth 354

In attendance: Robert G. Adair, Roger K. Braun, James B. Summers, William J. Downs, E. P. Sketch.

Exhibiting: Large mobile air conditioner, an 18 ton cooling unit designed and being produced for the Air Force. It delivers "150 lb of air at 45 F against a static pressure of 82.3 in. of water." While the unit is generally known as an air conditioner, its major function is a weather simulator to permit accurate calibration of aircraft electronic equipment and controls.

KELVINATOR DIV., AMERICAN MOTORS CORP., 14250 Plymouth Rd., Detroit 32 Mich.—Booth 453

In attendance: R. G. Alexander, N. J. Collins, P. R. Heitmeyer, G. L. Black, Wm. Kronauge, D. H. Carter, R. W. Fell, Robert Geran, T. W. Gitler A. R. Benua, D. J. Smith, H. L. Scott, M. O. Wehmeyer, I. E. Weber, A. L. Dombles, Geo. Jenson. Karl Van Gallow, Wm. Reinhardt, H. E. Carroll.

Exhibiting: 1958 room air conditioner (1½ or 2 hp), condensing units (open and sealed), hermetic compressor, air drier (dehumidifier).

KENMORE MACHINE PRODUCTS, INC., 15 Depew Ave., Lyons, N. Y.—Booth 307

In attendance: James A. Smith, C. R. Straubing, C. W. McCord.

Exhibiting: Strainers, dryers, accumulator dryers, capillary assemblies. New molecular sieve dryer and new "KMP Kap Kit" will be featured.

KEROTEST MFG. CO., 2525 Liberty Ave., Pittsburgh 22, Pa.—Booth 519

KIRSCH CO., REFRIGERATION DIV., 309 N. Prospect St., Sturgis, Mich.—Booth 327

In attendance: Pierce Allshouse, Gordon Meyer, Albert Schue.

Exhibiting: Copper tube, aluminum fin heat transfer surfaces for air conditioning equipment; steel condensers for refrigeration equipment. New steel coil for automobile air conditioning condenser applications will be featured.

KOCH ENGINEERING CO., INC., 321 W. Douglas, Wichita 2, Kans.—Booth 328

In attendance: Ranie H. Love, Earl H. Schreiber, Bill T. Lindsey.

Exhibiting: "Jet" cooling tower, 3 to 25 tons.

KOCH REFRIGERATORS, INC., 401 Funston Rd., Kansas City, Kans.—Booth 144

KRAMER TRENTON CO., Olden & Breunig Aves., Trenton 5, N. J.—Booths 439, 440, 441

In attendance: Nathan Kramer, Israel Kramer, Harold Kramer, Dan E. Kramer, Otto Nussbaum, S. Charles Segal, Jules Neishloss, George Frie.

Exhibiting: Heat transfer surface for original equipment manufacturers will be shown, and units covering the manufacturer's general line will be displayed. Four new basic developments, which will be presented to the trade for the first time at the show, "will be of special interest to air conditioning contractors and wholesalers."

LARKIN COILS, INC., 519 Memorial Dr., S. E., Atlanta 1, Ga.—Booth 405

In attendance: O. M. Sims, J. E. Palmer, P. A. Rose, R. M. Shrader, D. I. Lee, C. L. Schreeder.

Exhibiting: Air conditioning coils. Residential air conditioning evaporators for vertical and horizontal air flow, with remote fan unit, will be featured.

LAU BLOWER CO., 2027 Home Ave., Dayton 7, Ohio—Booth 543

In attendance: William W. Morrisey, Ralph Weaver, John Burrowes, Joe Gantner.

Exhibiting: Blowers, wheels, pulleys, belts, bearings.

LEHIGH MFG. CO., Fountain Ave., P. O. Box 1418, Lancaster, Pa.—Booths 156, 158

LEWIN-MATHES CO., DIV. OF CERRO DE PASCO CORP., 1111 Chouteau Ave., St. Louis 2, Mo.—Booth 770

In attendance: Rodrick J. Lewin, J. M. Dreyer, J. J. Marx, Robert Cook, F. P. Leonard, Jim Lewin, Robert Leonard, Donald Munroe.

Exhibiting: Copper and brass tube, pipe and rod.

LINDE CO., DIV. OF UNION CARBIDE CORP., 30 E. 42nd St., New York 17, N. Y. —Booth 319

In attendance: T. E. Wildish, E. F. Kennedy, E. L. Arnold, C. H. Daugherty, R. C. Mott, J. A. Peponis, J. C. Savage, E. S. Turner, Jr.

Exhibiting: "Prest-O-Lite" halide gas leak detector, "Purox" and "Prest-O-Lite" oxy-acetylene welding and cutting equipment, "Prest-O-Lite" air-acetylene apparatus for soldering, heating, and brazing. Live demonstration of halide leak detector will be featured.

LONERGAN COOLERATOR DIV., McGRAW-EDISON CO., 704 N. Clark St., Albion, Mich.—Booth 403

In attendance: Arthur J. Etes, Joseph W. Patzsch, Lou Goldman, H. T. Buehring, John R. Lonergan.

Exhibiting: Room units, central systems, remote systems, dehumidifiers. Electronic filters and heat pumps will be featured.

MADDEN BRASS PRODUCTS CO., 700 Sheffer Rd., Aurora, Ill.—Booth 655

In attendance: F. H. Moss, M. B. Madden, John Brinda, R. H. Lacart, A. Schramer.

Exhibiting: Hermetic port valves, tube piercing valves, refrigerant can piercing valves, flare fittings, brass pipe fittings, strainers, driers, and tube working tools. Multi-can charging kit, especially designed for automotive air conditioning service work, charging and testing manifold, new quick coupler charging line, and strainer capillary combination will be featured.

MARCO INDUSTRIES, INC., 3rd and Franklin, Womelsdorf, Pa.—Booth 253

In attendance: G. Russell Eddy, Robert B. Gage, Nick Polydoris, W. Edward Macbeth, Milton Mathews, O. A. Baumann, Jr., R. A. Baumann.

Exhibiting: Shaded pole motors for fans, blowers, condensing units, in-the-wall heating units, etc.; permanent split capacitor motors; split phase motors; motors for fan-coil units, portable air conditioners, humidifiers and dehumidifiers, and air conditioners. Small diameter capacitor and shaded pole motors for "thin" units, and small size motors for "midget," "bantam," and "portable" units will be featured.

MARLEY CO., THE, 222 W. Gregory, Kansas City, Mo.—Booth 267

In attendance: Don Cousins, R. J. Powell, F. B. Reed, J. J. Parker, Leo Kupecki.

Exhibiting: Representative models of line of "Aquatower" and "AquaCooler" cooling towers.

MARLO COIL CO., 6135 Manchester, St. Louis 10, Mo.—Booths 705, 707

In attendance: L. C. Pellegrini, W. H. Frenger, F. G. Meyers, Henry Kipp, R. Buss, J. McGivern, H. R. Iverson, K. W. Wicks.

Exhibiting: Central station air conditioning units, remote room air conditioning units, heating and ventilating unit, spray type dehumidifier, air cooled condenser, 5 ton cooling tower, 3 ton duct coil for residential application. New air cooled condenser, "one of an improved and expanded line of condensing equipment," and new line of air conditioning units for split systems, in floor and ceiling models up to 20 tons, with furniture finished cabinets, will be featured.

MARSH INSTRUMENT CO., 3501 W. Howard St., Skokie, Ill.—Booth 201

In attendance: Robert E. Barnett, William M. Ensign, Harry Kirby, James Kelly, Tom Zurick, Robert Ely, Don Warner.

Exhibiting: Refrigeration and air conditioning gages, thermometers, "Serviceman" testing instruments, regulating valves and solenoid valves. One inch water regulating valve having a range of 60 to 270 psi, for use on "Freon 12" and "Freon 22," will be featured.

MASTER-BILT REFRIGERATION MFG. CO., 4209 Folsom Ave., St. Louis 10, Mo.—Booth 729

In attendance: H. D. Warning.

Exhibiting: Cooling towers, 3 through 50 tons.

MAUREY MFG. CORP., 2907-23 S. Wabash Ave., Chicago 16, Ill.—Booth 140

In attendance: J. E. Maurey, R. B. Malloy, E. F. Sullivan, Ed. Ostrander, Robert J. Carr.

Exhibiting: Fractional horsepower V-pulley line, heavy duty sheave line, "Mor-Aire" high pressure fans, "Silent Air" domestic fans, cast iron fan V-pulleys, fractional horsepower V-belts. "Maureymatic" variable speed transmission will be featured.

MAYER CO., INC., GEO. J., 546 E. Market St., Indianapolis 9, Ind.—Booth 656

In attendance: George J. Mayer II, Roger W. Overstreet.

Exhibiting: Etched, lithographed, anodize, and stamped name plates, and bezels and trim for air conditioners.

McCORD CORP., Riopelle at E. Grand Blvd., Detroit 11, Mich.—Booth 206

McGRAW-EDISON CO.—see LONERGAN COOLERATOR DIV.

McINTIRE CO., THE, Okner Pkwy., Livingston, N. J.—Booth 160

In attendance: J. G. Beierlein, M. J. Meiklejohn, E. S. Chatlos, C. McC. Cooper.

Exhibiting: Dehydrators, filters, strainers, liquid indicators and other accessories. Suction line mufflers and new liquid indicators will be featured.

McQUAY, INC., 1600 Broadway, N.E., Minneapolis, Minn.—Booth 501

In attendance: B. E. James, D. P. Wilson, J. R. Resch, K. R. Lundberg, H. B. Williams, G. G. Workinger, D. C. Seitz, T. D. Merchant.

Exhibiting: Large capacity ceiling and "hideaway" type "Seasonmakers," air cooled condensers, floor type "Seasonmaker," 7½ ton vertical air flow evaporator, 7½ ton horizontal air flow evaporator. Thirty ton air cooled condenser of the propeller fan type, 7½ ton air cooled condenser of the centrifugal fan type, working model of new automatic hot gas defrost system, floor mounted product cooler unit coolers, and finned coils (⅜, ½, and ⅝ in. tube) will be featured.

MEIER ELECTRIC & MACHINE CO., 3525 E. Washington, Indianapolis 7, Ind.—Booth 546

In attendance: Raymond Stump, John E. Watts, Carl W. Basey.

Exhibiting: Propeller blades for all types of air conditioners. Newly designed propellers for compact units will be featured.

METALS & CONTROLS CORP., 34 Forest St., Attleboro, Mass.—Booth 701

In attendance: R. M. Glidden, Harold Damberg, Gordon Smith, C. B. Gwyn, Jr., Dennis Malloy, Gordon Morrison.

Exhibiting: Inherent overheat motor protectors, motor starting relays, fixed temperature thermostats, precision switches (Spencer Thermostat Div.) Clad precious and industrial metals, thermostat metals, electrical contacts (General Plate Div.) New fixed temperature controls, including manual reset and booted models, will be featured.

METREX VALVE CO., Franklin Park, Ill. and Glendora, Calif.—Booths 142, 143

In attendance: Chas. F. Toussaint, L. M. Toussaint, E. M. Toussaint, Paul Domke, Rudy Wolfe, David Snelling, Wm. McKeough, Richard Toussaint.

Exhibiting: Automatic condensing water regulators, thermostatic expansion valves, compressor service valves, dehydrators for all refrigerants, strainers and filters. Thermostatic fluid and gas control valves, three and four way water regulators for cooling tower applications, two stage multi-dessicant dehydrators, and liquid and gas control line valves will be featured.

MILWAUKEE ELECTRIC TOOL CORP., 5316 W. State, Milwaukee 8, Wisc.—Booth 746

In attendance: Tom Langdon, Larry Morand, Morrie Halvorsen, Jerry Heaston.

Exhibiting: Electric tools, especially ¼ in. drills, angle drills, "Sawzall", Pittsburgh lock hammer.

MINNEAPOLIS-HONEYWELL REGULATOR CO., 2753 4th Ave., S., Minneapolis 8, Minn. —Booth 561

MITCHELL MFG. CO., 3200 W. Peterson Ave., Chicago 45, Ill.—Booth 422

In attendance: Robert H. Lodge, E. Mankowski, W. F. Zale, H. Hartman, C. Schroeder, and all national district managers.

Exhibiting: Commercial air conditioning packages, 2 to 5 hp, air and water cooled; residential add-on units, 2 to 5 hp, air and water; residential split systems, 2 to 5 hp, air cooled; commercial self-contained air cooled systems, 2, 3, and 4 hp; residential self-contained air cooled systems, 2, 3, and 4 hp. Residential split systems and new commercial line will be featured.

MORRISON PRODUCTS, INC., 16816 Waterloo Rd., Cleveland 10, Ohio—Booth 262

In attendance: Thompson Morrison, Hunter Morrison, Jr., Al Galaba, W. H. Tonner, R. W. Leverenz, J. E. Parker, T. J. Small, C. E. Koch.

Exhibiting: Centrifugal blowers for air conditioning and evaporative cooler applications, both assemblies and component parts, featuring new "Unit Drive" assemblies.

MORTELL CO., J. W., 550 Hobbie Ave., Kankakee, Ill.—Booth 732

In attendance: R. J. Rivard, J. G. Ryan, E. T. Lund.

Exhibiting: Insulations, sealers, rust preventives, caulks.

MUELLER BRASS CO., 1925 Lapeer Ave., Port Huron, Mich.—Booth 446

MUELLER CLIMATROL, 2005 W. Oklahoma Ave., Milwaukee 1, Wisc.—Booth 506

In attendance: H. P. Mueller, Sr., H. P. Mueller, Jr., Frank J. Nunlist, D. Davidson, Otto Ress, George Hase, William S. Sutherland.

Exhibiting: Complete line of residential and light commercial units. Air cooled packaged unit, air handling unit, and remote waterless condensing unit will be featured.

MUNDET CORK CORP., 7101 Tonnelle Ave., North Bergen, N. J.—Booth 721

In attendance: Fred M. Herzog, Arthur B. Pike, Leon T. Choate.

Exhibiting: Thermal insulation, the centerpiece of the exhibit being a chart showing range of temperatures between minus 300 F and plus 1900 F, together with the insulation materials applicable for this range.

MUSKEGON PISTON RING CO.—see ROTARY SEAL DIV.

NATIONAL-U. S. RADIATOR CORP., 944 Ash St., Johnstown, Pa.—Booths 269, 271

In attendance: R. M. Anderson, F. L. Brown, P. L. Conway, A. L. Hospers, Sigmond Moroh, J. T. Obrig, W. G. Smith.

Exhibiting: Commercial packages, residential self-contained units, residential remote condensing and evaporator units, central station units, water chiller, fan coil units, air handling units. Combination "Flexazone" air handling unit integral with central station unit (compressor, evaporative condenser, heating and DX coil, blower); newly styled and redesigned commercial package unit, 3 through 20 tons; and residential air cooled condensing unit, remote evaporator, will be featured.

ONAN & SONS, INC., D. W., 2515 University S. E., Minneapolis 14, Minn.—Booth 712

In attendance: Hiram Hascall, James Hoiby, Perry Copeland, George Burda, Ken Hamilton.

Exhibiting: Truck cab air conditioners and engine compressor for air conditioning.

OWENS-CORNING FIBERGLAS CORP., National Bank Bldg., Toledo 1, Ohio—Booth 610

In attendance: J. E. Higgins, D. O. Eckley, R. G. Horchler, H. G. Ervin, E. F. Burow, M. L. Wrightsel, F. J. Hardesty, W. R. Wingfield.

Exhibiting: "Fiberglas U-Trim-It" air filters for room air conditioning, "Golden Dust-Stop" air filters, "Fiberglas Golden" filter media and adapter unit, "Fiberglas" prefabricated duct, low pressure pipe insulation, standard pipe insulation, dual temperature pipe insulation, duct insulations and low temperature insulations.

PACIFIC LUMBER CO., THE, 100 Bush St., San Francisco 4, Calif.—Booth 218

In attendance: Ray P. Klass, Stanley H. Dickson, James E. O'Rourke.

Exhibiting: New application methods of "Void-Free Palco Wool" insulation and "Zero Perm" vapor barrier.

PARAGON ELECTRIC CO., 1600 12th St., Two Rivers, Wisc.—Booth 313

In attendance: R. W. Eldred, T. Morrison, T. Casey, F. T. Hanson, W. B. Colvin.

Exhibiting: Time switches, Fan timers will be featured.

PEERLESS OF AMERICA, INC., 5800 N. Pulaski Rd., Chicago 30, Ill.—Booth 322

In attendance: R. W. Kritzer, Miles L. Abel, J. M. O'Connor, M. W. Knight, R. M. Russell, John Burge, Ray Rickard, Carl Johnson, Lee Cora.

Exhibiting: A new coil surface, known as "Universal-K", used for air conditioning coils (both condenser and evaporator) and especially adaptable to automotive air conditioning, window air conditioning units and household central system coils will be featured, as will "U-K" baseboard heating surface.

PENN CONTROLS, INC., Goshen, Ind.—Booth 541

In attendance: R. H. Luscombe, Paul Penn, K. W. Cash, F. X. Fessler, Carlos Morgan, Emile Tassin, J. Johnsonbaugh, H. Gray, J. Moravec, W. Bowen, K. Fisher, R. Ratliff, I. Stepnich, D. Peters, J. Forbes, A. Barr, P. Pestow, J. Corbett, J. Garrett, G. Sander, H. King, K. Lamm, H. Shilling, A. Walters.

Exhibiting: Automatic controls for year 'round air conditioning, cooling and heating. Air conditioning limit controls; three-way water regulating valves for cooling towers; "Rimset" thermostat for residential air conditioning, heating and cooling; and all-range water regulating valves will be featured.

PENNSALT CHEMICALS CORP., 3 Penn Center Plaza, Philadelphia, Pa.—Booth 565

In attendance: Frank Lucard, Arnold E. Blitz, Richard Willson, Robert Mills.

Exhibiting: "Isotron" refrigerants. New "Handi Can" disposable refrigerants will be featured.

PERFECTION INDUSTRIES, DIV. OF HUPP CORP., 1135 Ivanhoe Rd., Cleveland 10, Ohio—Booth 455

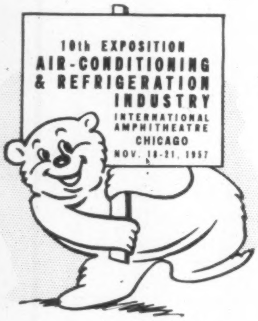
In attendance: C. W. Millsom, H. C. Erhard, M. A. Miller, A. B. MacLaren, W. H. Smith.

Exhibiting: "Regulaire" and other winter air conditioners with cooling coils; "Regulaire" and other winter air conditioners; 3 hp commercial packaged water cooled air conditioner; 3 hp air cooled condensing unit; "Tuckaway" self-contained air cooled air conditioners. The winter air conditioners and the "Tuckaway" units will be featured.

PRICE & RUTZEBECK, P.O. Box 30, Hayward, Calif.—Booth 737

In attendance: John D. Rutzebeck, William A. Crosbie, Ben Richard, Joseph E. Capen, Warren Frenell, Ray Grimes.

Exhibiting: "Planetor Magic Feed" boring bits, "Grips Rite" angle heads, "Handy" angle saws. Angle saw "Supreme" blades for cutting hard metals will be featured.


10th EXPOSITION
AIR-CONDITIONING & REFRIGERATION INDUSTRY
INTERNATIONAL AMPHITHEATRE
CHICAGO
NOV. 18-21, 1957

PUROLATOR PRODUCTS, INC., 3927 Fourth, Wayne, Mich.—Booth 622

In attendance: J. D. Abeles, R. T. Karr, H. J. Markert, J. P. Nesbitt, E. B. Delaney, R. Dale, C. Cox, L. A. Maysilles, D. B. Walper, T. Johnson, J. B. Lightburn, C. Fleszar.

Exhibiting: Driers, mufflers, receivers, oil separators, accumulators, strainers, filters.

RANCO INC., 601 W. 5th Ave., Columbus 1, Ohio—Booth 410

In attendance: J. H. Manecke, Ward Stanley, Russell Kraft, Carl Haueisen, Russell Bartholomew, Bruce Weber, Martin Vidis, A. C. Homeyer, H. M. Laird, E. V. Dunbar, C. E. Whipps, Herman Goldberg, J. D. Merkle, C. E. Boren, F. G. Slagel, G. Wharburton, C. M. Spielman.

Exhibiting: Commercial panel controls, slide type reversing valves, de-icer controls. Central cooling system in operation with new reversing valve and de-icer control will be featured.

R B M DIV., ESSEX WIRE CORP., 131 Godfrey St., Logansport, Ind.—Booth 221

In attendance: V. A. Hedlund, P. C. Talmadge, W. T. Hopkins, S. C. Goodling, A. C. Bakas, H. L. Huntsinger.

Exhibiting: Potential relays, enclosed power relay, air conditioning starters and contactors.

READING TUBE CORP., 350 Fifth Ave., Rm. 2301, New York 1, N. Y.—Booth 103

RECOLD CORP., 7250 E. Slauson Ave., Los Angeles 22, Calif.—Booths 116, 117

In attendance: H. T. Jarvis, D. D. Wile, H. L. Quinn, H. A. Halls, Hal Jarvis.

Exhibiting: A 30 minute film tour through the manufacturer's factory will be featured.

REDMOND CO., INC., 201 Monroe St., Owosso, Mich.—Booth 264

In attendance: J. W. Tweedy, M. J. Koenig, R. Burns, K. Heiberg, H. Mulbar, R. Banghart, W. Brown, A. Elkins.

Exhibiting: F.H.P. electric motors for air conditioning.

REFRIGERATING SPECIALTIES CO., 3004 W. Lexington St., Chicago 12, Ill.—Booth 411

In attendance: Charles C. Hansen, H. W. Mey, C. C. Hansen III, Albert O. Leapley, Frank Hunka.

Exhibiting: Refrigerant solenoid valves, back pressure regulators, condensing water regulators, large water solenoid valves. Operating model of three-way condensing water regulator for cooling tower systems will be featured.

REFRIGERATION APPLIANCES, INC., 923 W. Lake St., Chicago 7, Ill.—Booth 401

In attendance: E. Niederer, Hugh D. Smart, D. Niederer, H. W. Morgan, Donald Croeger, Frank A. Klaas, E. H. Niederer, Jr.

Exhibiting: Air cooled condensers, residential lowside equipment, remote air handling units.

REFRIGERATION RESEARCH, INC., 9901 E. Grand River, Brighton, Mich. — Booth 214

In attendance: E. W. Bottum, C. A. Powers, John Sobieski, Frank Rockwell, Howard Wietzke.

Exhibiting: "Deluxe" and "Blue Ribbon" heat exchangers, accumulators and accumulator-driers, "Deluxe" dryers and strainers, cartridge strainers and strainer elements, fabricated tube parts, "Bull Dog" filter drier, mufflers (2 through 30 hp), and suction accumulator will be featured.

REMCO INC., Zelienople, Pa.—Booth 336

REVCOR, INC., 251 Edwards St., Carpentersville, Ill.—Booth 719

In attendance: J. F. Kochevar, J. H. Reichwein, R. F. McCall.

Exhibiting: "Blastaire" blower wheels, "Revcor" blower wheels, blower wheel housings. New double inlet blower wheel with single center disc construction will be featured.

REYNOLDS METALS CO., 2000 S. 9th St., Louisville 1, Ky.—Booths 451, 508

RHEEM MFG. CO., 7600 S. Kedzie, Chicago 29, Ill.—Booth 174

In attendance: J. L. Hoyer, R. B. Gilbert, J. Brownell, P. Fetzek, W. Lorentz, R. B. Faltermeier, J. Curfman, R. Kendall.

Exhibiting: "Rheemaire" residential and commercial units, water cooled commercial units, through-the-wall room coolers, combination heating-cooling units. New residential and commercial units will be featured.

ROTARY SEAL DIV., MUSKEGON PISTON RING CO., Sparta, Mich.—Booth 254

In attendance: G. R. Targett, R. J. Hicks, E. A. Jaeschke, D. W. Hamm, J. A. Nelson, L. N. Dolhun.

Exhibiting: Refrigeration seals, piston rings, precision castings, sintered metal parts.

RUBATEX DIV., GREAT AMERICAN INDUSTRIES, INC., Bedford, Va.—Booth 137

In attendance: King Daywalt, R. T. Dunlap, Jr., W. C. Walters, R. B. Harper, D. A. Levine, S. W. Henning.

Exhibiting: Closed cellular rubber fabricated parts used in the air conditioning industry, closed cellular rubber tubing for cold line insulation.

SCHNACKE, INC., Governor Rd., N., Evansville 7, Ind.—Booth 673

SEALED UNIT PARTS CO., INC., 261 E. 161st St., New York 51, N. Y.—Booth 162

In attendance: Henry Ehrens, Sidney Weiner, Ed Casper.

Exhibiting: Rebuilt compressors for air conditioning units up to 2 hp, double and triple feed capillaries for air conditioners, new cleaning chemical for sealed unit compressors, strainers, driers, connecting rods, valves, springs, gaskets, oil additive.

SMITH CORP., A. O., ELECTRIC MOTOR DIV., 531 N. 4th St., Tipp City, Ohio—Booth 703

In attendance: C. M. Poston, R. Chapman, J. Jackson, R. Axthelm.

Exhibiting: Hermetic and blower motors.

SOUTHERN PLASTICS CO., 408 Pendleton St., Columbia, S. C.—Booth 139

SOUTHWEST MFG. CO., 151 Elliott, Aurora, Mo.—Booth 671

In attendance: B. T. Church, Leonard Bisby, Joe Fisher.

Exhibiting: 3½ hp hermetic conditioner, 3 hp remote condenser, 3 hp air handling unit, 3 ton evaporator coil assembly. The 3½ hp hermetic air conditioner, full rated capacity, will be featured.

SPENCER THERMOSTAT DIV. — see METALS & CONTROLS CORP.

SPORLAN VALVE CO., 7525 Sussex Ave., St. Louis 17, Mo.—Booths 323, 325

In attendance: H. F. Spoehrer, W. T. Carmody, W. F. Wischmeyer, W. L. Canfield, C. C. Grote, W. H. Krack, J. T. Barry, M. D. McAnany, and territory sales engineers.

Exhibiting: Thermostatic expansion valves, refrigerant distributors, solenoid valves, "Catch-All" filter-driers, strainers, "Level-Master" liquid level control, crankcase pressure regulating valve. "Catch-All" filter-drier, 100 ton capacity solenoid valve for refrigerant 12, and solenoid valve with capacity ratings 5 tons for refrigerant 12 and 7.5 tons for refrigerant 22 will be featured.

SPRAGUE ELECTRIC CO., Marshall St., North Adams, Mass.—Booth 166

In attendance: Arthur Christopher, Andrew Kariotis, David Simonds, Anthony Ruscito.

Exhibiting: Motor-start capacitors and motor-run capacitors; "Koolpaks" (packaged motor-start and motor-run assembly). "Jr. Koolpaks" for room air conditioners, etc., will be featured.

STANDARD REFRIGERATION CO., 332 S. Hoyne Ave., Chicago 12, Ill.—Booth 563

In attendance: H. A. Goldberg, H. M. Goldberg, Robert Rose, Richard Levine, R. E. Cook, R. E. Porter, D. D. Orr.

Exhibiting: Shell and coil condensers, shell and tube condensers, counterflow condensers, liquid receivers. Booster condensers for combination air and water usage will be featured.

STILES KARLSONITE CORP., 1550 Grand Ave., Waukegan, Ill.—Booth 329

In attendance: James F. Stiles III, Wesley N. Karlson, Marshall Segal, Ed Rosen.

Exhibiting: Phosphate water conditioner for preventive maintenance on cooling towers, heat exchangers, condensers, etc., for algae, slime and scale control.

STODDARD INDUSTRIES, INC., 1545 N. Kingsbury St., Chicago 22, Ill.—Booth 652

In attendance: Ford Stoddard, Geo. H. Cantrell, Hazel Kline, Craig Stoddard, John D. Stoddard, Clare A. Perlin.

Exhibiting: "Lifetime Dust-magnet" electrostatic filters, featuring new models.

SUN OIL CO., 1608 Walnut St., Philadelphia 3, Pa.—Booth 539

In attendance: F. F. Palmer, E. S. Ross, Bill Huth, E. A. Siefken, Wm. B. Daub, R. Golden, R. W. Regan, A. G. Nussdorfer.

Exhibiting: New "Suniso" refrigeration oil, featuring "greater oil-refrigerant stability and improved low temperature characteristics."

SUPERIOR VALVE & FITTINGS CO., 1509 W. Liberty Ave., Pittsburgh 26, Pa.—Booth 556

In attendance: W. A. Siegfried, G. R. Allen, F. E. Davis Jr., T. E. Cunningham, W. C. Yocum, A. M. Eaches, B. U. Hill, D. E. Hughes, F. N. Robson, W. E. Kruse, R. J. Talty, C. E. Bensen, W. P. Myers, K. W. Rose, A. L. Brown, H. H. Brown, G. N. Harris, E. Harris.

Exhibiting: Components and accessories for air conditioning equipment. "Hermetic Eye" sight glass, new relief valves, and new line of heat exchangers will be featured.

TECUMSEH PRODUCTS CO., Tecumseh, Mich.—Booth 457

In attendance: T. W. Rundell, D. J. Bowen, H. M. Kelso, A. S. Russell, F. G. Purcell, P. G. Colgrove, W. E. Macbeth and representatives from all district sales offices.

Exhibiting: Hermetic compressors for central air conditioning applications from 1 to 5 hp and window air conditioning compressors from ½ to 2 hp, including representative models and cutaways of the basic designs. Featured will be special size and shape new window cooler compressor particularly adapted for portable air conditioners; new ¾ and 1 hp, 7½ amp models; new 1 hp, 12 amp model; and new 2 hp window cooler and central air conditioner compressor.

TEMPRITE PRODUCTS CORP., P. O. Box 72, E. Maple Rd., Birmingham, Mich.—Booth 504

In attendance: Lud. Emde, James W. Archibald, Allan J. Christison, William Pollock, Robert W. Gentry.

Exhibiting: Oil separators, sound mufflers, instantaneous and storage liquid coolers.

TENNEY ENGINEERING, INC., 1090 Springfield Rd., Union, N. J.—Booths 619, 620

TEXAS CO., THE, 135 E. 42nd St., New York 17, N. Y.—Booth 203

In attendance: G. J. Stevenson, R. G. Krueger, L. D. Halleck, M. Longmore, G. F. Chmelik, K. J. Einweck, J. D. Anderson, T. J. Borris, E. P. O'Sullivan, R. J. Auer, D. C. Colby.

Exhibiting: "Texaco Capella" waxfree oils.

TORK TIME CONTROLS INC., 1 Grove St., Mount Vernon, N. Y.—Booth 651

In attendance: Cyril J. White, Dorset J. White, John Beier, Michael Bizzoco, Richard S. Batlan.

Exhibiting: Time switches, including single pole and double pole models, for use in both package and built-up commercial air conditioners, with "Skip-A-Day" and seven-day dials. The former is a regular 24 hr dial providing night shut-down and week-end omission. Portable plug-in units to control window conditioners up to 1 hp, and with the "Skip-A-Day" dial, will be featured.

TORRINGTON MFG. CO., THE, Torrington, Conn.—Booth 361

In attendance: Dudley B. Robinson, Leonard C. Lindstrom, Frank C. Hohmeister, Charles A. Hathaway, Kenneth A. Merz, Anwar A. Atalla, William E. Cashen, Merrill B. Hunting.

Exhibiting: "Tab Lock" and "Airotor" blower wheels, blower units, standard fan series. "Radiax" blower unit, "VB" blower unit, plastic fan, "High Mode" fan for special electronic application, and resilient fan hub will be featured.

T O T TOWERS, INC., P. O. Box 2564, 5220 Lawndale, Houston 1, Tex.—Booth 161

In attendance: W. C. Andereck, Patrick J. McTeigue, B. W. Embry, J. M. Berry, Max R. Kerr.

Exhibiting: Cooling tower.

TUBE MANIFOLD CORP., 415 Bryant St., N. Tonawanda, N. Y.—Booth 727

In attendance: Dean M. Rockwell, Richard F. Burke, R. O. Jones, Robert J. Lenz, Clark D. Matthews, Clyde L. Webb, Robert Gray, C. G. Baker, E. E. Weil.

Exhibiting: Molecular sieve-filter driers, liquid receivers, and receiver driers for automotive air conditioning systems.

TYPHOON AIR CONDITIONING CO., DIV. OF HUPP CORP., 505 Carroll St., Brooklyn 15, N. Y.—Booth 303

In attendance: Don V. Petrone, Arthur H. Farr, Mark E. Mooney, Murray Kabili, Larry D. Spence, Maurice T. Firestone, John F. Wilcox, Norman A. Mendes.

Exhibiting: 8 ton, 15 ton, and 30 ton packaged units; "Economy" line; air cooled condensing units; high side; low side. New line of air cooled condensing units ranging from 2 to 20 tons capacity will be featured.

UNION CARBIDE CORP.—see LINDE CO.

UNITED CORK COS., 50 Central Ave., Kearny, N. J.—Booth 338

UNITED STATES AIR CONDITIONING CORP., 7900 Tabor Rd., Philadelphia 11, Pa.—Booth 260

In attendance: D. E. Feinberg, Richard I. Tanner, R. D. McLain, William Moiselle.

Exhibiting: Packaged refrigeration equipment, air cooled condensing units and accompanying evaporator assemblies, refrigerated "Kooler Aire" units. "Modu-Aire" units will be featured.

UNITED WIRE & SUPPLY CORP., 1497 Elmwood Ave., Providence 7, R. I.—Booth 764

In attendance: J. G. Landrigan, C. A. Morris, E. E. Stursberg, W. T. SanSouci, E. Sullivan.

Exhibiting: Tubing, copper and copper base alloys, aluminum, brazing materials and fluxes. New silver brazing rings for automatic brazing, fin tube, and special tempered copper and aluminum tube for air conditioning will be featured.

UTILITY FAN CORP., 911 E. 59th St., Los Angeles 1, Calif.—Booth 268

In attendance: M. McGuire, C. V. Smith, T. Kindred, S. Skaftee, J. Pinkus, L. Gorsey, H. Leo, R. Peterson.

Exhibiting: Centrifugal blowers. New "high efficiency-slow speed blower especially for air handling units and evaporative condensers" will be featured.

VIBRATION MOUNTINGS, INC., 98-25 50th Ave., Corona 68, N. Y.—Booth 637

In attendance: Bernard A. Ross, Jack Spachner, Norman J. Mason, Harold Harris.

Exhibiting: New line of colored neoprene-in-shear noise and vibration absorbing mountings and pipe hangers, molded in five sizes and five degrees of rubber hardness "to obtain maximum deflections within each load range," the colored neoprene stock "making an easy-to-remember color-key for proper selection." Also, vibration control and noise absorbing mountings and pads utilizing steel springs, cork, neoprene-in-shear, and combinations of these materials.

VIKING COPPER TUBE CO., 16700 St. Clair Ave., Cleveland 10, Ohio—Booth 312

In attendance: Bailey I. Ozer, Frank W. Jamieson, Frank Higham, R. L. Coan, A. J. Wolf, R. A. Nungesser, Adam B. Koblitz.

Exhibiting: Specially tempered seamless copper tube for use in air conditioning coils.

VILTER MFG. CO., THE, 2217 S. 1st St., Milwaukee 7, Wisc.—Booth 136

In attendance: A. O. Vogel, R. A. Klokner, M. F. Tokach, D. E. Perham, J. B. Kupfer, J. F. Heil, C. McCrindle, H. H. McKinnies, Howard Eggert.

Exhibiting: A 16 cylinder multi-cylinder compressor unit, direct connected to a 200 hp motor, the compressor of the type that can be used for either "Freon" or ammonia, mounted on a steel base, together with standard switches, gages, etc., will be featured.

VIRGINIA SMELTING CO., West Norfolk, Va.—Booth 549

In attendance: Dr. M. A. Kise, R. H. Israel, H. T. Palmer, Peter Eustis, sales representatives from all territories.

Exhibiting: Refrigerants (cylinders and disposable cans), water treatment chemicals (scale and corrosion inhibitors), sealing compounds, pipe insulation materials. New "Closed-Cel" tubing for pipe insulation will be introduced.

WABASH CORP., 2300 S. Western Ave., Chicago 8, Ill.—Booth 154

WAGNER ELECTRIC CORP., 6400 Plymouth Ave., St. Louis 14, Mo.—Booth 672

In attendance: G. W. Brown, H. N. Felton, A. C. Allen, M. H. Nelson, L. C. Dobrunz, J. P. Harbacek, B. L. Britt, H. Sisk, W. E. Prewitt, D. L. Kearns, J. B. Holston, R. L. Tucker, L. W. Carnahan, G. H. Rentschler, Jr., M. D. Paul, G. J. Halas, J. H. Wolf, S. R. Snyder, M. B. Atkinson, A. F. Duernberger, F. B. Minx, L. A. Murphy, P. M. Poslethwaite, R. H. Lane, R. W. Larson, C. W. Malanowski, E. O. Krueger, L. W. Jones, B. M. Saunders, P. F. Ryan, F. H. Vocks, R. K. McLuen.

Exhibiting: Typical electric motors, including fractional and integral horsepower general purpose motors, special pump motors, hermetic motors and sleeve bearing resilient base motors in integral ratings through 5 hp "for applications where maximum quietness is required." A demonstration unit showing the operation of a four step part winding motor and increment starter, and a demonstration showing the relative quietness of sleeve bearings in electric motors, will be featured.

WALL TUBE AND METAL PRODUCTS CO., P. O. Box 330, Newport, Tenn.—Booth 642

In attendance: Frank Lesley, Richard Erickson, Merle Holst, John Goble, Max Wachowiak, Frank Dempsey.

Exhibiting: Wire and tube static and forced draft condensers and evaporators. "Fin Spin" condensers and evaporators (with flat metal fin spun onto a tube, the fin and tube "then formed into any size or shape limited only by return bend radius") will be featured.

WALTON LABORATORIES, INC., 1186 Grove St., Irvington 11, N. J.—Booth 752

In attendance: Wm. Feldermann, J. B. Feldermann, J. R. Lewis, G. T. Lyons, F. Hartwell.

Exhibiting: Humidifiers for wide variety of applications, including residential, commercial and industrial requirements, in range of sizes from less than 1 lb up to 30 lb per hr. Modified residential "On-Duct" and commercial "In-Duct" humidifiers for winter air conditioning, and a new filter protected model room humidifier "particularly useful for those installations where dust in the air has been a maintenance problem," will be featured.

WATSCO, INC., 1020 E. 15th St., Hialeah, Fla.—Booths 235, 236

In attendance: William Wagner, Stuart Wagner, Nelson D. Wagener, Robert Kastle.

Exhibiting: Tapping valves, shut off valves, magnetic check valves, reverse cycle valves, terminal seals, inside replacement terminals, compressor gaskets, flapper valves, strainer-capillary combinations, formed copper strainers, accumulators. Reverse cycle valve in operation will be featured.

WEATHERHEAD CO., THE, FORT WAYNE DIV., 128 W. Washington Blvd., Fort Wayne, Ind.—Booth 738

In attendance: A. S. Wade, Geo. Anderson, W. D. Mack, Charles Craig, Jack Myers, Charles Sutton, Fred Bromelow.

Exhibiting: Tube fittings, valves, receivers, mufflers, dryers, hose assemblies; flared and flareless tube fittings of brass and steel; re-usable and permanently attached hose assemblies; special screw machine products.

WESTINGHOUSE ELECTRIC CORP., 653 Page Blvd., Springfield 6, Mass.—Booths 355, 356

Exhibiting: 2 hp duct air conditioner, special window accessory kit, 1958 dehumidifier line.

WESTINGHOUSE ELECTRIC CORP., AIR CONDITIONING DIV., P. O. Box 510, Staunton, Va.—Booths 249, 250, 251, 750

In attendance: B. D. Henderson, D. R. Meckstroth, W. B. Cott, T. L. Rundlett, R. L. Sherrill, Jr., R. D. Hartsig, H. A. Blair, C. H. Weaver, Jr., T. J. Mullen.

Exhibiting: Residential central air conditioning units, packaged chiller, commercial central air conditioning units, centrifugal machine. Heat pumps will be featured.

WHITE-RODGERS CO., 1209 Cass Ave., St. Louis 6, Mo.—Booths 714, 716

In attendance: R. Sherer, G. Powell, A. Petersen, E. Harwood, R. Weber, W. Chesbro, E. Robinson, E. Wechsler, W. Dague, V. Hertz, A. Hudson, W. Hawkins, J. Morgan, J. Vidt.

Exhibiting: Thermostats, temperature and pressure controls for air conditioning. New "Push-Button" heating-cooling thermostat, new "Fashion" thermostat for air conditioning, and new air conditioning master control panels will be featured.

WILCOLATOR CO., THE, 1001 Newark Ave., Elizabeth, N. J.—Booth 658

In attendance: R. R. Forrester, Jr., P. E. McCaughey, D. L. Marshall, R. Van Petten, John Modla, Geo. Becker.

Exhibiting: Room cooler thermostats.

WOLVERINE TUBE DIV., CALUMET & HECLA, INC., Guardian Towers - Guardian Bldg., Detroit 26, Mich.—Booth 551

WORTHINGTON CORP., Ampere Station, East Orange, N.J.—Booths 123, 124, 126

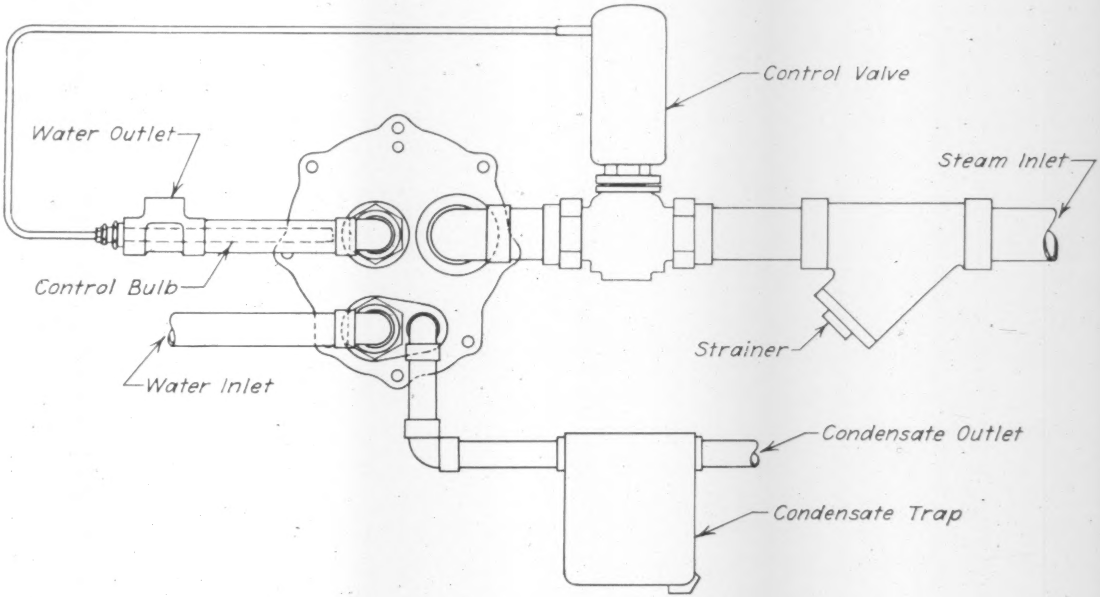
In attendance: R. O. Gundlach, J. J. Drury, P. J. Dalton, F. Dolar, G. Partch, G. Melahn, D. Robson, R. Steinmann.

Exhibiting: "Flexi-cool," air cooled package, 15 ton liquid packaged chiller, multi-zone air handling, evaporative condenser, fan and coil unit, self contained room unit. Dry pan evaporative condenser and new liquid packaged chiller will be featured.

YORK CORP., Roosevelt Ave., York, Pa.—Booths 643, 644, 645, 646

In attendance: John Roth, Bill Goldsmith, Dave Crawford, Bern Maseritz, Bob Cassett, Bob Werden, Jim Farrell, Caron Ehehalt.

Exhibiting: "Home Comfort Center," "Pathfinder," 3 hp remote air cooled condenser, "Yorkaire" unit, "Snorkel" and "Compact" room air conditioners. The "Home Comfort Center," room air conditioners and line of condensing units will be featured.



1 STEAM INLET CONTROL method of regulating condensate removal is one way to control temperature of water in a booster heater. Theromstatic bulb in water outlet throttles steam supplied to unit

Hot Water Booster Heaters: What Every User Should Know

BY E. SPENCER
Graham Mfg. Co., Inc.

HOT WATER BOOSTER HEATERS keep industry supplied with instantaneous hot water for cleaning and processing in a variety of applications. Here are suggestions for applying, sizing, controlling, installing, and servicing them.

Where to Apply Boosters

Instantaneous heaters are most suitable for large, continuous water heating loads or for large, momentary water heating loads. They are not designed for general water heating systems. They should be applied to a specific water heating situation and the water taken from the heater should be used directly in one place. They are not adaptable for maintaining a multiplicity of temperatures.

These heaters are particularly applicable for supplying hot water to bottle washing machines and dishwashers. They do not use a great deal of hot water, but the flow rate is usually very high. A dishwasher might require 10 gal of water for a period of 20 sec at a temperature of 180 F. The heater for this system should be sized on the basis of 1800 gph of water at 180 F.

Storage and instantaneous heaters are sometimes required to work together. The water may be heated directly from the mains at 50 or 60 F to 180 F, if necessary, but this would require a larger heater at the washer.

How to Select Proper Size

To select the correct size of heater it is necessary to know:

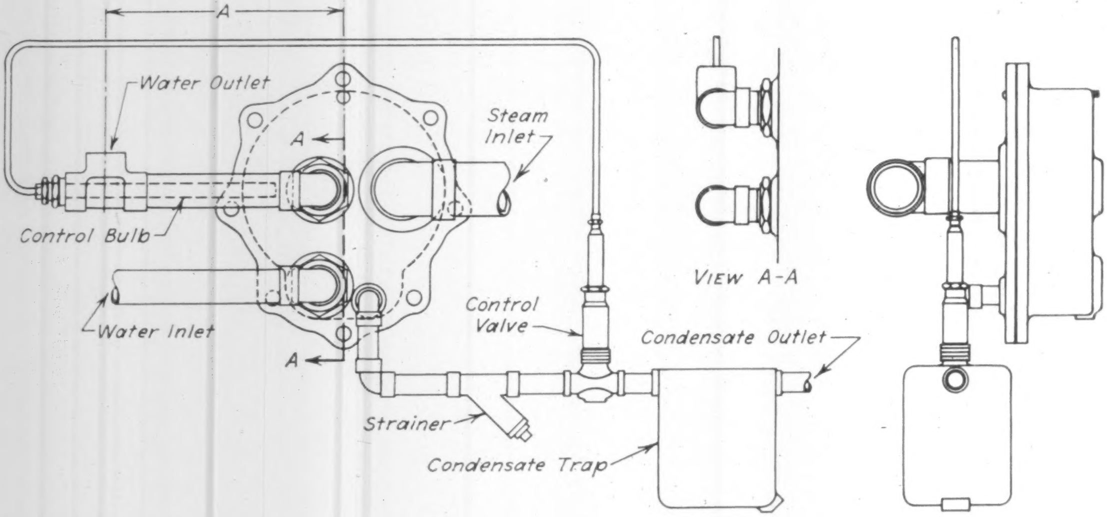
1) Number of gallons per minute of water to be heated.

2) Entering water temperature.

3) Leaving water temperature.

4) Steam pressure or steam temperature.

5) Operating water pressure.

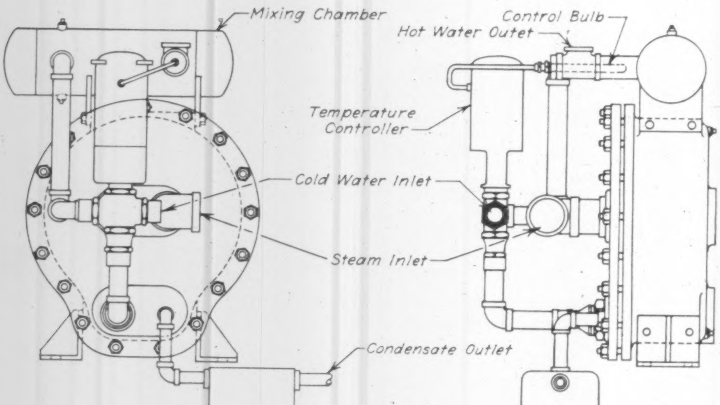

A
Water Outlet
A
Steam Inlet
Control Bulb
Water Inlet
A
Control Valve
VIEW A-A
Condensate Outlet
Strainer
Condensate Trap

2 CONDENSATE CONTROL, a second method of controlling water temperature, also has a thermostatic bulb in the water outlet, but control is effected by stopping flow of condensate from exchanger and building up a level of condensate within the shell

6) Pressure loss allowed through the heater.

Since an instantaneous unit has a large heating capacity, it will require a large boiler capacity to supply the necessary steam.

For example, a coil type instantaneous hot water heater only 8 in. in diameter and 5 in. deep would have the capacity to heat approximately 350 gph of water from 60 to 180 F and would require a boiler capable of generating 360 lb per hr of steam. This is more steam than can be generated by a 10 hp boiler. If the boiler is less than 10 hp, the instantaneous heater will not work because its requirements will be larger than the boiler.


Mixing Chamber
Control Bulb
Hot Water Outet
Temperature Controller
Cold Water Inlet
Steam Inlet
Condensate Outlet
Condensate Trap

3 MIX CONTROL is recommended when flow rates vary widely. Full pressure steam is on the heater case at all times; cold incoming water is blended through the control valve with hot water that has previously passed through the helical coil

Boilers should be large enough to serve both the maximum requirement of the instantaneous heater and all additional loads which may be imposed upon them for other heating requirements.

With any type of heater, lines which supply the steam to the heater must be sized for the load. The determining factor is the rate at which water is heated rather than the total quantity of water heated in the given period of time.

The steam line to the unit should be capable of delivering steam at the required pressure without excessive pressure drop. When the heater is selected, this pressure drop should be taken into consideration. If steam is available at 15 psig at the boiler, and a 5 psig pressure drop in the lines can be expected, the heater should be sized to perform the required duty with steam at 10 psig rather than the 15 psig steam available at the boiler.

Inadequately sized steam lines will impose a larger pressure drop than expected and will reduce the steam pressure. Reduction in steam pressure means a reduction in steam temperature. Hence, the temperature to which water can be heated and the amount of water which can be heated to a given temperature will be reduced.

Inadequately sized steam lines will also throttle the quantity of steam which can get to the exchanger, thereby reducing the quantity of water which can be heated. Lines must be sized so that with maximum flow of steam the pressure at the exchanger is that required by the design conditions.

How to Size Traps

Any heater will not operate properly unless condensate removal is properly controlled. If condensate is not removed as rapidly as it is formed, it fills up the shell side of the exchanger rapidly, reducing the amount of surface in contact with steam and thereby reducing the capacity of the heater.

It is recommended that traps for instantaneous heaters be sized for two to four times the maximum steady flow of condensate depending on the type of traps and the application.

How to Provide for Control

Steam control valves should be sized to transmit the maximum quantity of steam which the unit will require. Condensate control valves should also be sized for the maximum rate of condensate flow.

One method uses steam inlet control and places a thermostatic bulb in the water outlet which throttles the steam supplied at the unit.

Another method, shown in Fig. 2, may be described as condensate control. It also places a thermostatic bulb in the water outlet, but control is effected by stopping the flow of condensate from the exchanger and building up a level of condensate within the shell.

Both control methods can use self-actuated control valves or air operated relay type control valves. The self-actuated unit is, however, less accurate than the air operated relay type.

Instantaneous hot water heaters can be properly controlled by these methods under steady flow conditions. When flow rates vary widely, however, the controls do not have an opportunity to react, and it is difficult to keep temperatures within ±2 F.

Another way to do this is to use an arrangement such as that shown in Fig. 3. The control requires steam in the heater at all times, under full pressure. The cold incoming water is blended through the control valve with hot water that has previously passed through the helical coil. By this manner, a desired operating temperature is maintained for the combined streams regardless of the rate of flow. At low flow rates, larger amounts of cold water will be blended with the hot water coming from the coil, and at high rates of flow, little cold water is blended to secure the desired outlet temperature.

This system is a reverse operating controller. The mixing valve is wide open at low rates and is fully closed at the higher rates of flow.

The arrangement, while slightly more expensive than the steam inlet control or condensate control systems, is ideal for widely fluctuating demand conditions where extreme accuracy is required.

Self-actuated control valves should be selected to withstand the steam pressure imposed without binding.

How to Install Heaters

Certain precautions should be taken when heaters are installed. The steam trap should be checked to assure proper functioning and to be certain that proper drainage from the steam traps is provided. On startup the air in the system should be eliminated so that the steam fills the heat exchanger casing. A small hand valve may be installed in the vent so that air may be bled from the system.

It is important that the instantaneous heater be close to the point of use, since water leaving the exchanger will be cooled in the piping from the unit. This piping should be well insulated. Since these heaters are often used where the duration of the heating cycle is as short as 10 or 15 sec, water in the pipe may represent a fair portion of the flow during this short cycle.

How to Service Heaters

When an instantaneous heater fails to heat water to the desired temperature after it has been in service for some time, the following items should be checked at the unit to be sure that design conditions have not changed:

1) Steam pressure.
2) Water pressure.
3) Inlet water temperature.

If any of these values differ from the design conditions, the difficulty is not with the heater.

Also, improper operation may result because of dirty coils or traps not functioning properly. Repair of the traps or cleaning the coils will remedy this situation.

A check of auxiliary equipment and coil condition once a year is usually sufficient.

It is wise to take precautions against valving off the water side of these instantaneous exchangers. If it is possible to close valves on both sides of the heat exchanger, difficulty can be expected from hydraulic expansion when the steam is turned on. This expansion builds up tremendous pressures which eventually result in a leak or permanent damage to the exchanger. It is not necessary that these be stop valves. Often a faulty solenoid or check valve can cause the same trouble. ‡

Sam Lewis' Page

Musts in Designing Air Systems

- select fan with correct outlet velocity to keep noise low
- provide at least five diameters of straight duct on both sides of fan
- balance air flow resistance on suction sides of double width, double inlet fan wheels
- provide cleanout door in housing of centrifugal fan
- enclose thrust collars for single inlet centrifugal fans, lubricate carefully
- don't oversize fan motors
- provide manually operated doors at all outside air intakes

I LIKE to select a supply fan having an outlet velocity not more than about 200 fpm greater than the design velocity in the duct to which the fan is connected. A 1700 fpm outlet velocity supply fan in a plant where the duct velocities are limited to 1000 fpm is indiscreet as to noise.

• Intelligent manufacturers of centrifugal pumps have recognized and published the fact that the inlet and outlet pipe connections to the pump have a profound effect on efficiency. At least five diameters of straight pipe approaching an inlet or an outlet of a pump are helpful. The same reasoning applies to the approach and discharge ducts of a centrifugal fan. I blush, in the light of this obvious truth, when I think of some short, abrupt, fan connections of which I have been guilty.

SAMUEL R. LEWIS, *consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments informally each month on practical heating, piping, and air conditioning problems.*

• All double width, double inlet fan wheels should have balanced resistance to air flow on the suction sides, as otherwise there will be competition between the two inlets, one or the other grabbing the load in succession, with chaotic pressures and eddies and unnecessary noises. I paid for rebuilding a plant in a theater where I failed in this precept.

• Most ventilating fan wheels will be found coated with oil and dust, due to leaking bearings. It is very difficult to prevent oil being drawn along the shaft by suction from fan bearings. I like to see a cleanout door in the housing of a centrifugal fan. Every tank and every airway compartment between filters and convectors on any decent installation has a manhole door. Very few centrifugal fans have manhole doors permitting the scroll space or the blades to be inspected or cleaned or repaired.

• Centrifugal pumps always have some means for caring for the thrust, endways, of the shaft. This thrust is present, to no small extent in single inlet centrifugal fans. Usually it is met by a shaft collar, subject to haphazard lubrication and rapid wear. Thrust collars, therefore, ought to be enclosed and lubricated with considerable care.

More attention should be given to fan selection with reference to electrical input. In a lamentable number of installations the fan motors are oversize, anticipating possible sudden overloads, with a resultant inefficient load factor.

• I am weary of looking through alleged tight dampers which show, against a light, crack leakages of relatively vast proportions.

Anyone who has worked, as I have, on a subzero day behind the alleged protection of such dampers, would suggest additional manually operated real doors at all outside air intakes; these doors, closed against weather stripped jambs, should be somewhat better than cobwebs for protection.

The object of the Society is to advance the arts and sciences of heating, ventilating, cooling and air conditioning, and the allied arts and sciences, for the benefit of the general public, to encourage and conduct scientific research, and to cooperate with other organizations having the same or similar objectives.

Heating, Piping & Air Conditioning

Journal Section

of the

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

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SOCIETY COMMITTEE ORGANIZATION

General Committees: The By-Laws provide for 9 such committees. The latest list appears in the August 1957 issue on page 156

Research Committees: The research program is under the guidance of the Committee on Research — a General Committee. The Committee on Research appoints Technical Advisory Committees as needed. The listing appears in the September 1957 issue on page 180

Special Committees: At present there are 9 of these committees. The latest list of them and of their personnel can be found in the August 1957 issue on page 156

Nominating Committee: This committee's membership is fixed by the By-Laws. The latest listing appears in the August 1957 issue on page 156

SOCIETY REGIONAL ORGANIZATION

The latest listing of the names of the Regional Directors and of the members of the Chapters Regional Committees appears in this issue on page 202

SOCIETY CHAPTERS AND BRANCHES

The Society has chartered 69 Chapters, 1 Overseas Branch, and 6 Student Branches. These groups elect their officers and governing boards. A list of the presidents and secretaries appears in the October 1957 issue on pages 165-166

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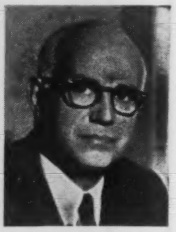
The President's Page



The Society and Legislation

FROM time to time, I am asked to what extent the Society and its Chapters may participate in legislative matters having to do with the development or improvement of local codes and ordinances relating to heating, ventilating and air-conditioning matters. This year, the question arose at several of the meetings of the Society's Chapters Regional Committees. Fundamentally the answer is to be found in the Charter.

Primarily, the Society is organized to advance the arts and sciences of heating, ventilating, cooling and air conditioning, and the allied arts and sciences, for the benefit of the general public, to engage in scientific research and educational activities, to disseminate knowledge and information, to form Chapters, etc., — all as outlined in the stated purposes of the Society and set forth in its Charter. One specific clause of these stated purposes empowers the Society to "cooperate with governmental agencies, . . . in the furtherance of the foregoing purposes."

However, all of the Society's powers are subject to the proviso that "this corporation shall be operated exclusively for scientific and educational purposes; no substantial part of the activities of this corporation shall be the carrying on of propaganda or otherwise influencing or tending to influence legislation; . . . ."

This subject of legislative activity is not new. In 1951, the Executive Committee requested legal counsel of the Society to prepare a statement of the Society's position, and which was published in the January JOURNAL of that year. Substantially, the situation in 1957 is much the same as it was in 1951, and the following excerpts are from that statement.

> The Society and its said instrumentalities *may not*, by any substantial part of their activities, attempt to influence federal, state or local legislation by propaganda or otherwise. Specifically they *should not*:
>
> (a) Make contact with legislative bodies advocating or condemning legislation, except by the express invitation of interested legislators.
>
> (b) Make efforts to bring about outside pressure for or against legislative action by publications, circulars, pamphlets, petitions or otherwise, or encourage others so to do.
>
> (c) Solicit, receive or expend funds, render services or devote facilities for legislative or propaganda purposes.
>
> (d) Contribute sums, services or facilities to other persons, groups or organizations for the purpose of influencing legislation.
>
> (e) Employ or pay any person, group or organization to influence legislation.
>
> (f) Make reimbursement for expenses incurred in connection with such activities.
>
> The Society and its agencies, however, *may*:
>
> (a) Express the Society's position editorially or by resolution concerning legislation affecting the arts and sciences in which the Society, by the terms of its Charter, is legitimately interested — but the Society should not go beyond mere expression of opinion. (For example: The Society would have no legitimate interest in legislation respecting the welfare of engineers or their social or economic position, or in proposals to police the profession or control the conditions under which its members work, or the ethics or manner in which they execute their employment.)
>
> (b) Appear before legislative bodies upon legislative invitation only, for the purpose of setting forth constructive scientific and technical views relating to proposed legislation affecting said arts and sciences.
>
> (d) Make its research reports and periodicals available to governmental agencies in the manner in which they are available to the public.
>
> (e) Contribute to persons, groups or organizations a part of whose objects and activities may be towards influencing legislation, but such contributions should be limited to the specific purposes authorized by the Society's Charter, and the Society should see to it that its contributions are utilized for the purposes specified.

The foregoing extracts indicate that our Society and its Chapters and members should be able *upon invitation* to express their technical *viewpoint* concerning codes, ordinances and legislation having to do with heating, ventilating and air-conditioning work. We are a technical society serving the public interest in this field — and should be willing and able to make available our advice and our assistance with helpful *engineering information*.

However, it is important to remember that, in providing such advice and assistance, the Society and all of its agencies (Council, officers, committees, chapters, branches, employees, and independent representatives and members when acting in behalf of the Society) should conform to the rules of safe conduct as outlined in the statement and thus protect the Society's legal and tax position.

P. B. Gordon
President
AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

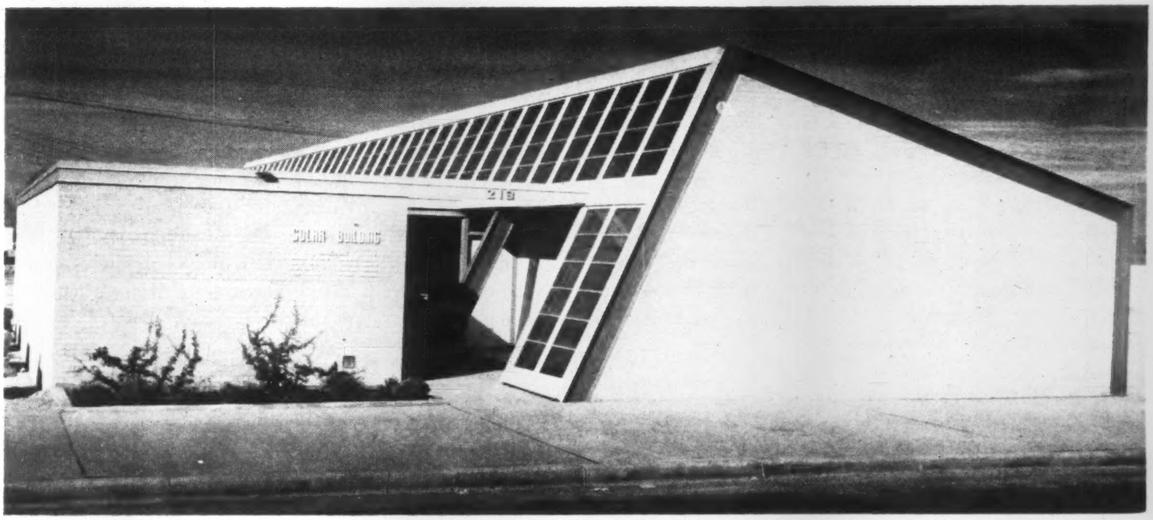


Fig. 1 — Solar Building, Albuquerque, N.M., showing flat-plate collectors which form most of south side

Performance of a Solar Heated Office Building

By F. H. Bridgers[*], D. D. Paxton[*] and R. W. Haines[†], Albuquerque, N. M.

What is believed to be the first solar heated office building in the world, located in Albuquerque, N. M., was occupied in August 1956, and has operated successfully during the 1956-57 heating season. The 4,300 sq ft building has flat plate collectors, south facing, inclined 30 deg from the vertical, with single pane cover of ordinary double-strength glass, and a net collector area of 750 sq ft.

A 6,000-gal insulated underground water storage tank is used to store collected solar heat for cloudy weather and night-time use. A nominal 7½ ton package water chiller is used as a heat pump in winter and for cooling the building in summer. In winter, the water chiller is used as a heat pump only when the storage water temperature is not at a high enough level to satisfy the building heating requirements, and is automatically placed in operation by means of a space thermostat. An evaporative water cooler serves as a cooling tower for the heat pump on the summer cooling cycle. It is also used as a direct means of cooling the building in intermediate seasons. The distribution system within the building consists of a floor panel heating system in the high ceiling portion (north of the collector plates), a ceiling panel heating system in the low ceiling portion (south of the collector plates) and a forced air ventilation system serving all areas. The ventilating system has a 6-row water coil to warm air in winter and cool air in the summer. All items of equipment in the building are of standard manufacture with the exception of the collector plates. The collector plates consist of flat aluminum plates painted black with heat absorbing paint and ½ in. O.D. copper tubes soldered to form a continuous bond on the back side. Water passes through the copper tubes to remove the collected solar heat.

The building has structural steel bents supporting wood stud walls with 3 in. of glass fiber insulation. The solar collector plates are supported on a wood framework on the south side of the building.

The heat loss of the building based on 70 F indoors and 0 F outdoors is 118,570 Btu per hr, as calculated by the conventional method. This is equivalent to 29 Btu per hr heat loss per sq ft of floor area.

The total cost of the building was $58,500 or $13.60 per sq ft. The mechanical system, including the plumbing, heating and air conditioning was $17,400 or $4.05 per sq ft.

Instrumentation for determining the performance consists of thermometer wells with test thermometers in the piping entering and leaving storage tank, solar collectors, heat pump evaporator and condenser, and heating coils. A separate 3-phase electric meter is provided for the heating system, independent of lights. A rotameter is located in the circulating water line to the collectors. All solar radiation data were obtained from the Weather Bureau which is about 3 miles from the building.

---

[*] Partner, Bridgers & Paxton, Consulting Engineers. Member of ASHAE.

[†] Chief Engineer, Bridgers & Paxton, Consulting Engineers. Member of ASHAE.

For presentation at the 64th Annual Meeting of the American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa., January, 1958

Journal Section

The system has been designed to provide year-around comfort at the lowest feasible operating cost. Controls are arranged to obtain 5 different water circuits to heat or cool the building depending on outside weather conditions. The direct solar heating circuit is schematically illustrated by Fig. 2. Water is either pumped through the solar collector or bypasses the collector as determined by a differential thermostat with one bulb at the pump discharge and one bulb at the face of the collector plates. Whenever the temperature at the face of the collectors is lower than the entering water (such as it would be at night), the water bypasses the collectors. A room thermostat determines how much of the water passes through the heating system and how much bypasses to continue collecting heat. Whenever the storage water temperature drops below a level required to maintain the building temperature, such as after long periods of cloudy weather, the space thermostat automatically changes the water circuits as illustrated by Fig. 3 and starts the water chiller which is used as a heat pump. The heat pump continues to operate until the room thermostat is satisfied. After the room thermostat is satisfied, the water circuit will change back to direct solar heating (Fig. 2), provided the temperature of the water in the storage tank is not lower than the water circulating through the heating system. A differential thermostat with one bulb in the condenser pump discharge and the second in the water leaving the storage tank, will not allow water from the storage tank to circulate through the heating system until the storage tank water is warmer than the water circulating through the heating system. It is possible to supply the full design heat output to the building with the heat pump even if the storage water temperature should drop to 40 F. Figs. 3, 4 and 5 illustrate various cooling cycles. In spring and fall, heating is required during night and morning, while cooling is required in the afternoon. Fig. 3 illustrates a cycle in which the evaporative water cooler is used to cool the building while at the same time solar heat is stored in the storage tank. During the early and late part of the cooling season, the evaporative water cooler is operated all night and the water that is cooled by the low wet-bulb night air is stored in the storage tank for use the fol-

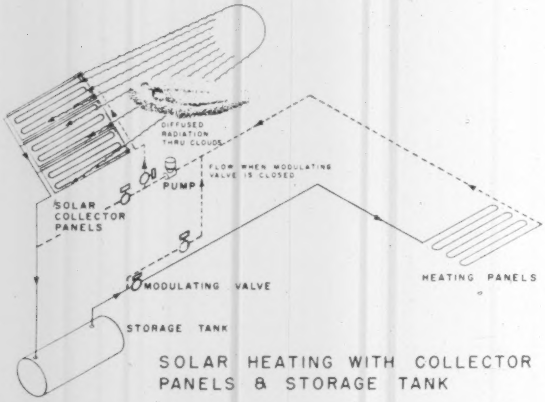

DIFFUSED RADIATION THRU CLOUDS
FLOW WHEN MODULATING VALVE IS CLOSED
PUMP
SOLAR COLLECTOR PANELS
MODULATING VALVE
HEATING PANELS
STORAGE TANK
SOLAR HEATING WITH COLLECTOR PANELS & STORAGE TANK

Fig. 2 — Schematic flow diagram — direct solar heating

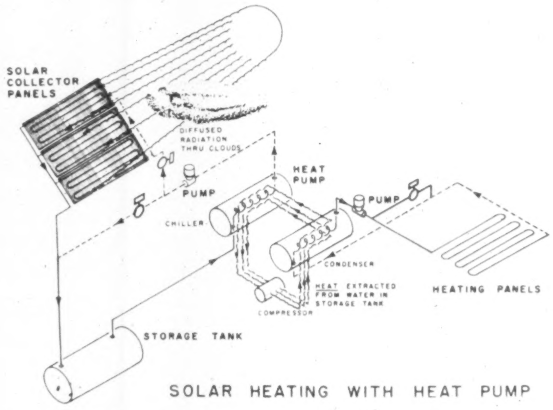

SOLAR COLLECTOR PANELS
DIFFUSED RADIATION THRU CLOUDS
HEAT PUMP
PUMP
CHILLER
PUMP
CONDENSER
HEAT EXTRACTED FROM WATER IN STORAGE TANK
COMPRESSOR
HEATING PANELS
STORAGE TANK
SOLAR HEATING WITH HEAT PUMP

Fig. 3 — Schematic flow diagram — solar heating with heat pump

Table 1 — Summary of sunshine and weather data, Solar Building, Albuquerque, N.M.

1	2[a]	3[b]	4[a]	5[a]	6[a]	7[c]	8[d]	9[e]
Month '56-57	Avg Temp, F deg Out-door	Avg Temp, F deg In-door	Degree-Days	Possible Sunshine Percent	Avg Langleys, gm Calories per sq cm	Avg Storage Tank Temp	Avg Collector Efficiency, Percent	Slope Factor
October	60.3	—	195	83	468	—	—	—
November	41.0	73.0	715	91	367	87.2	59.5	2.2
December	36.3	71.4	880	85	306	80.1	60.0	2.3
January	39.9	72.0	771	49	258	59.2	66.0	2.2
February	48.1	73.5	468	63	390	77.2	59.0	2.1
March	47.3	73.2	543	64	488	83.5	52.0	2.0
April	54.2	—	317	73	620	88.6	54.0	1.8
May-June[f]	—	—	126	—	—	—	—	—

[a] Columns 2, 4, 5 and 6 taken from Weather Bureau Data as summarized in Reference 1. Langleys are measured on a horizontal surface.

[b] Column 3 is a 24-hr average indoor temperature as recorded in two different parts of building 3 times per day.

[c] Column 7 is an average storage tank temperature of water leaving tank as recorded 3 times per day.

[d] Column 8 is calculated using the outdoor temperature (Column 2) and average collector surface temperature (Column 7 plus 8 F.) with curves in Reference 5. For November and December curves for a *clear day* were used, and for January, February, March and April, curves for partly cloudy days were used.

[e] Column 9 is the experimental ratio of incident radiation for a collector at optimum slope to the incident radiation on horizontal surface based on the work of Bliss[2] to determine the factor of 2.3 for December. Other values are calculated by geometric relationships as given by Hottel[3].

[f] Cooling was done considerably more in May and June than heating so that degree-days is the only pertinent data for these months.

lowing day. This cycle is illustrated by Fig. 5 and provides for year-round utilization of the storage tank. When the cooling loads are too high to use the evaporative water cooler directly, it becomes a cooling tower for the packaged water chiller, and conventional chilled water cooling is accomplished as illustrated schematically by Fig. 6.

All changeovers between the various cycles described are accomplished by a manual selector switch except that the changeover between direct solar heating and the heat pump heating is automatic.

A few operating difficulties arose when the system was first started, such as corrosion causing pinhole leaks in the original aluminum collector plates with integral water passages (repaired by soldering copper tubes to the back of the aluminum plates), freeze-up of water in collector panels that did not drain properly, and inadequate venting due to the large quantities of air introduced when the collector plates were drained. The collector panels are drained automatically if panel temperature approaches the freezing point. After the necessary corrective measures were taken to rectify these difficulties, the system operated without any problems for the rest of the heating season.

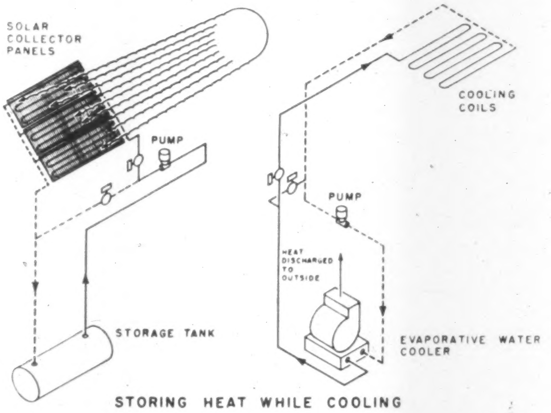


Fig. 4 — Schematic flow diagram — simultaneous heat collection and cooling

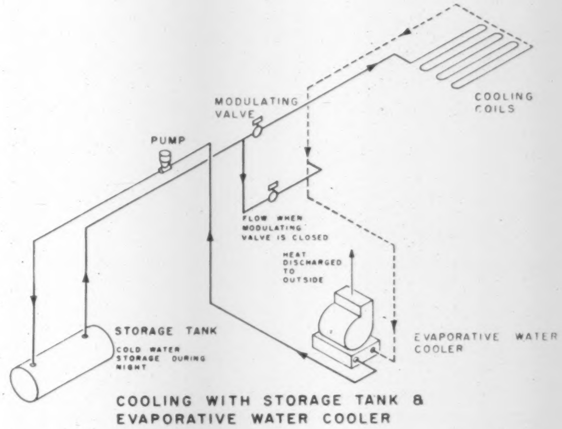

COOLING COILS
MODULATING VALVE
PUMP
FLOW WHEN MODULATING VALVE IS CLOSED
HEAT DISCHARGED TO OUTSIDE
STORAGE TANK
COLD WATER STORAGE DURING NIGHT
EVAPORATIVE WATER COOLER
COOLING WITH STORAGE TANK & EVAPORATIVE WATER COOLER

Fig. 5 — Schematic flow diagram — cooling with evaporative water cooler

Journal Section

Use of a heat pump with a solar collector has much to recommend it, particularly if cooling is a consideration. In cold and cloudy weather, the storage and collector temperatures may be allowed to fall very low with a resultant increase in collector efficiency and storage capacity. The heat pump permits the use of a smaller collector and storage tank. Since the heat pump can be used for summer cooling, the system becomes more economically attractive.

Table 1 shows a summary of the sunshine and weather data for the 1956-57 heating season. The winter was relatively mild (4015 degree-days compared with 4389 normal degree-days), however, January had more cloud cover than any other January in Weather Bureau history. Note in Table 1, column 5, that the percentage of possible sunshine was only 49 percent which was lower than New York City, Chicago, Boston or Philadelphia for the same period.

Table 2 summarizes the amount of heat pump operation. For the entire heating season, direct solar heating (Fig. 2) supplied 62.7 percent of the total heating requirements while the remaining 37.3 percent was supplied

Table 2 — Summary of heat pump operation, 1956-57, Solar Building, Albuquerque, N.M.[a]

Month	Total Heating Requirements MBtu	Hours of Heat Pump Operation, Per Month	Heat to Building with Heat pump Operating, MBtu	Ratio of Heating with Heat Pump to Total Heating
October	7,900	0	0	0
November	29,100	33.1	4,440	0.152
December	35,700	111.3	14,500	0.406
January	31,300	216.0	25,300	0.810
February	19,000	75.4	9,260	0.487
March	22,000	39.3	5,260	0.239
April	12,900	14.8	1,980	0.154
May-June	5,000	0	0	0
Total for Heating Season	162,900	489.9	60,740	0.373

[a] Total energy supplied to operate heat pump — 13,350 MBtu (3,923 kw hr); average coefficient of performance of heat pump — 4.5; total energy for heating from collectors (heat pump and direct solar) — 149,550 MBtu (91.8 percent).

Note: Total heating requirements calculated from degree-days from Reference 1. The total for the season includes degree-days for October and May.

with the heat pump unit operating. It should be emphasized that the major source of the heat was from the solar collectors, which is true even when the heat pump was operated. The amount of energy required to run the heat pump supplied only 8.2 percent of the total heating requirements.

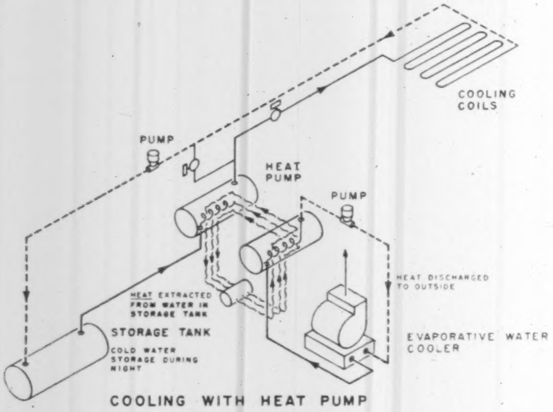

COOLING COILS
PUMP
HEAT PUMP
PUMP
HEAT DISCHARGED TO OUTSIDE
HEAT EXTRACTED FROM WATER IN STORAGE TANK
STORAGE TANK
COLD WATER STORAGE DURING NIGHT
EVAPORATIVE WATER COOLER
COOLING WITH HEAT PUMP

Fig. 6 — Schematic flow diagram — cooling with heat pump

Nomenclature

CF = cubic foot.
C.O.P. = coefficient of performance.
DD = degree-days (base 65 deg).
K.W.Hr. = killowatt hour.
L = solar radiation in Langleys (gram-calorie per sq cm per day).
MBD = thousand British thermal units per day.
MBtu = thousand British thermal units.
MCF = thousand cubic feet.
SF = slope factor.
%SS = percent of possible sunshine.
η = efficiency.
η_c = efficiency of solar collector.

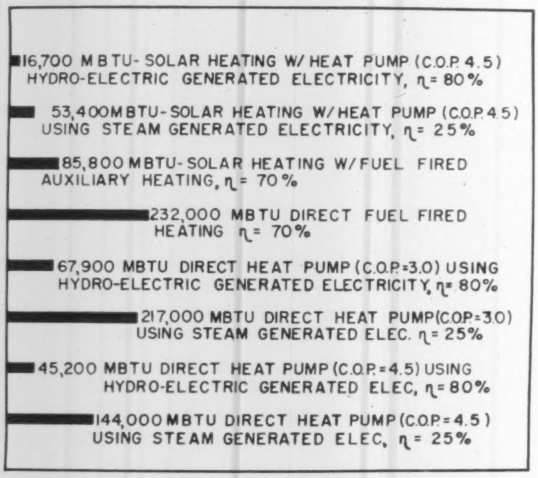


Fig. 7 — Comparative depletion of energy reserves for different types of heating systems based on performance of Solar Building (1956-57)

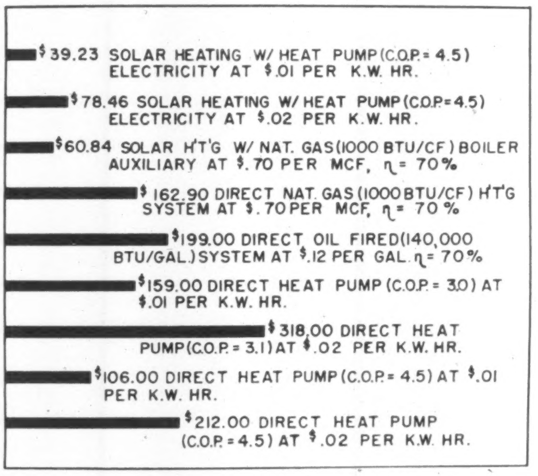


Fig. 8 — Comparative operating costs for different types of heating systems based on performance of Solar Building (1956-57)

Fig. 7 illustrates the advantages of solar heating in regard to the problem of depletion of energy reserves. Solar heating in Albuquerque with a heat pump using steam-generated electricity consumes approximately 25 percent as much energy (excluding solar energy) as a conventional gas-fired heating system.

Fig. 8 illustrates the heating energy cost of solar heating compared with other conventional type systems. The energy cost for the Albuquerque Solar Building was $78.46 (the electrical cost for the heat pump operation was $0.02 per K.W.Hr.) where the energy cost for a conventional gas-heating system would have been $162.90 plus $6.00 minimum charge making a total of $168.90. (The charge for small gas quantities averages $0.70 per MCF where for large uses it would decrease as low as $0.44.) This is a 53 percent saving in fuel cost for a winter with a lower percentage of sunshine than usual. However, based on present fuel prices, a savings of this magnitude would not make the additional initial cost economically sound. The trend of fuel cost increasing at a faster rate than electrical energy cost will probably continue, particularly in view of the possibility of atomic generated electrical energy. This could make a heat pump-solar heated system economically attractive in a relatively short time.

Fig. 9 illustrates the relationship between the heat pump operation and the most important variables that determine how often the heat pump will operate, such as the number of degree-days and the solar radiation intensity. Note that a large change in degree-days or solar radiation is not followed by a change in heat pump operation until a week later. This is due to the large capacity of the storage tank.

Fig. 10 shows a comparison of the calculated storage tank temperature and the recorded temperature. The method of calculation has been improved from that described in a previous paper[4] and is illustrated in the Appendix. For the comparison shown in Fig. 10, the heating required was calculated by the conventional degree-day method (with a 65 F base). The slope factor (2.3 for December 21) used for the ratio of incident radiation on a collector at optimum slope to that on a horizontal collector was applied only the percentage of time that the sun was shining, since collection of diffuse radiation is independent of slope. The disagreement toward the end of the month can not be readily explained, although some of the reasons may be as follows:

1. The calculations are based on U. S. Weather Bureau data which is recorded at a site about 3 miles from the Solar Building. On partly cloudy days, cloud conditions may vary considerably from one area to the other.
2. Water circulation in the solar collectors could have been temporarily stopped due to air in lines.

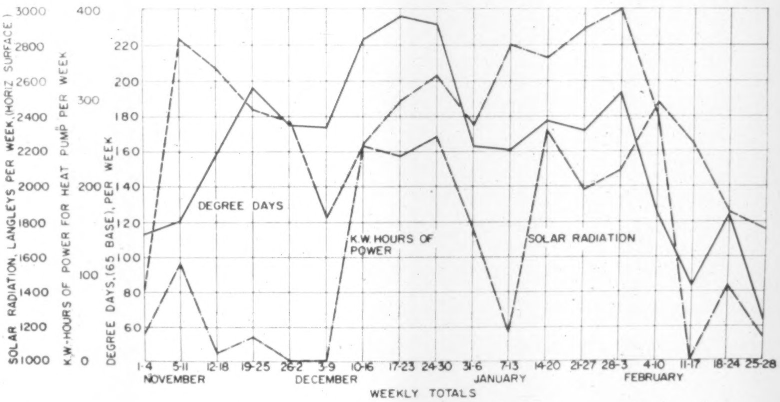


Fig. 9 — Heat pump operation (K.W.Hr.) related to degree-days and solar radiation; solid line shows degree-days; dash line shows solar radiation; and dot and dash line shows kilowatt hours

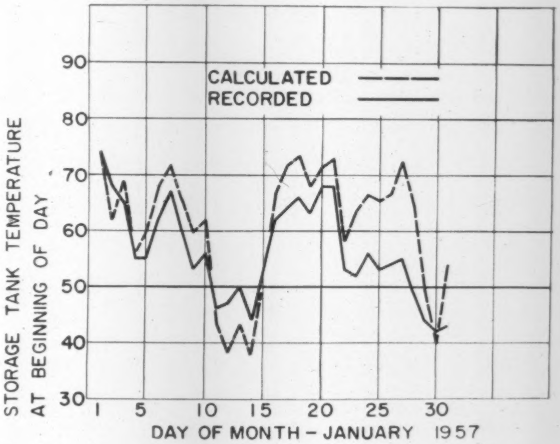
Fig. 11 is an attempt to show some correlation between the factors affecting the ratio of the heat which must be supplied by an auxiliary heating unit to the total heat requirements. The abscissa is a parameter containing the factors that have the most important effects on the collection of solar heat, and the total heat requirements. (See Appendix for Nomenclature of symbols in the parameter). The point for February is far off the curve, which can be logically explained by the fact that the storage water temperature was very low after an unusually cloudy January, and although the weather for February was mild and had a comparatively large amount of solar radiation intensity, the heat pump had to operate almost continually until the storage temperature became high enough to heat the building directly. It is readily admitted that there are not enough points to make the curve shown on Fig. 11 valid, but if such a curve were valid, it would be possible to predict fairly quickly the economic feasibility of a solar heating system for any locality.

All variables in the parameter can be obtained directly from Weather Bureau Data (Reference 1) except efficiency and slope factor which can be calculated as outlined in References 3 and 5. A family of curves like the one shown in Fig. 11, representing various ratios of Btu per hr heat loss per sq ft of collection could be prepared to allow a quick economic study with a large variation in design conditions. The points on the curve of Fig. 11 will be carefully checked during the coming heating season.

It is believed that the test data are reasonably accurate for field type test conditions. The solar radiation data could be greatly improved by having a pyrheliometer at the building rather than depending on Weather Bureau data recorded 3 miles away.

It is believed that the improved design procedure as illustrated in the Appendix is satisfactory for determining the range of water temperature to be encountered under the most adverse conditions. As shown by Fig. 10, the actual storage water temperature appears to change more slowly than calculations would indicate, which is probably due to heat entering and leaving storage in the building structure.

Fig. 10 — Comparison between calculated storage temperature and recorded storage temperature



It is felt that a water system with a heat pump is a very satisfactory system as far as giving year-round comfort and ease of operation.

Before an overall economic evaluation can be made of the building, the operating cost data for the cooling season will have to be included. At this time, a full cooling season has not been completed. With the present cost of fuels for heating, the savings in fuel costs do not justify the necessary first cost expense for a solar heating system in most localities in the United States. However, there are some areas where the high fuel cost would make a solar heating system economically sound. With the continual depletion of fuel reserves, the increasing research activity in the solar energy field, the increasing demand for air conditioning, and the possibility of future cost reduction in solar collectors, the solar heating system with a heat pump may be economically attractive over a large part of the United States in a relatively short time.

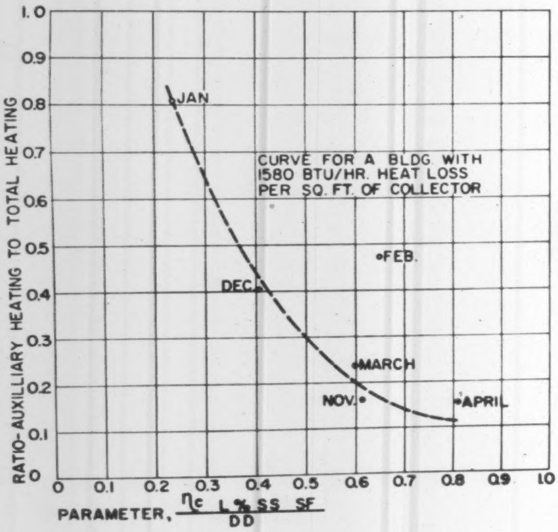


Fig. 11 — Correlation between the ratio of auxiliary heat (heat pump) to total heat

References

1. Climatological Data — National Summary (U. S. Dept. of Commerce, Weather Bureau, Monthly Publications, June, 1956 to April, 1957).

2. Design and Performance of the "Nation's only Fully Solar Heated House," by Raymond W. Bliss, Jr. (*Air Conditioning, Heating & Ventilating*, October, 1955).

3. Performance of Flat Plate Solar Energy Collectors, by H. C. Hottel (Paper presented at Space Heating with Solar Energy Symposium, M.I.T., August, 1950).

4. Solar Heat for a Building, by F. H. Bridgers, D. D. Paxton, R. W. Haines (*Mechanical Engineering*, June, 1957).

5. ASHVE Research Report 1502 — Availability and Utilization of Solar Energy Parts I, II and III, by R. C. Jordan and J. L. Threlkeld (ASHVE Transactions, Vol. 60, 1954, pp. 177-238).

APPENDIX

The equations used in the calculations are derived as follows:

For the heat required: The heat loss was calculated at 118,570 Btu per hr. including ventilation air, based on 0 F outside and 70 F inside. Heating requirements were based on the conventional degree-day method.

$$118{,}570 \text{ Btu/hr.} \times 1/1000 \times 24 \text{ hr./day} \times (65 - \text{avg daily temp})/70 = 40.6\,(65 - \text{avg daily temp}), \text{ MBD} \quad ..(1)$$

Although the degree-day method is based on 70 F inside, no correction was included for the higher inside temperatures maintained as shown in Table 1, since it was assumed that the internal heat gains from lights and other sources would offset the theoretically greater heating requirements for the higher inside temperature.

For those periods when storage tank temperatures are below 85 F, the heat pump must be used. In this case some of the work energy goes into the condenser water as heat and must be accounted for.

The actual solar energy withdrawn from storage will be the calculated heat required multiplied by a factor of 0.8.

The average temperatures are determined from Weather Bureau records.

For the heat collection: The heat collected is a function of solar radiation availability, efficiency, and collector area. Solar radiation received on a horizontal surface is recorded by the Weather Bureau. However, this must be extrapolated to the sloping, southfacing surface of this collector. This extrapolation factor can only be estimated. The Weather Bureau Station at Blue Hill records radiation data on vertical surfaces facing each of the cardinal points as well as on the horizontal surface. Jordan and Threlkeld[5] have developed curves for extrapolating these data to other latitudes.

The values also can be calculated theoretically using solar altitude and incident angle. We actually used a multiplier of 2.3 for the slope factor for January and December, which was based on experimental work by Bliss[2]. It is hoped that a pyrheliometer can be obtained and mounted on the sloping collector to confirm this. The multiplier of 2.3 would be applicable only for periods when the sun is shining since collection of diffuse radiation on cloudy days would not be affected by the slope of the collector.

Weather Bureau data are given in Langleys per day. One Langley is one gram-calorie per square centimeter. A multiplier of 3.69 converts this to Btu per day per square foot.

Efficiency is largely a function of the difference between collector temperature and outdoor temperature, though it is also affected by cloudiness, particularly at greater temperature differentials. Efficiencies used here are based on the curves developed by Jordan and Threlkeld[5]. In determining efficiencies, it was assumed that collector temperature was 8 deg above storage temperature and the difference used was that between average outdoor temperature and average collector temperature. This required a trial-and-error solution since final collector temperature is not known until calculations have been made for the day.

Then, *collection equals*: Langleys (on horizontal surface) × 3.69 × 2.3 × 750 sq ft × efficiency × 1/1000 (to convert to MBD) × %SS + Langleys × 3.69 × 750 sq ft × efficiency × 1/1000 × (1 − %SS).

Or, *combining terms, collection equals*: (6.36 × Langleys × efficiency) (%SS) + (2.76 × Langleys × efficiency) (1 − %SS).

Calculations were then made to determine use and collection. The difference was added to or subtracted from the storage temperature at the rate of 50,000 Btu per degree storage temperature change (6000 gal of water).

A High-Flux Low-Temperature Solar Collector

By R. G. Nevins*, Manhattan, Kans., and P. E. McNall, Jr.**, Hopkins, Minn.

SUMMARY—Solar collection efficiencies of 65 to 75 percent were obtained on clear days during the summer of 1956 with a focusing low-temperature solar collector. A 5-ft diameter surplus searchlight mirror was used to focus the solar energy on a 6-in. diameter collector mounted near the focus of the mirror. Solar energy was collected at a rate of 3700 to 4200 Btu per hr at collector temperatures of 100 to 170 F. Collection efficiencies on cloudy days varied from 40 to 60 percent based on the available direct radiation and from 30 to 45 percent based on the available total radiation.

Theoretical analysis is presented to show the effect of the concentrating power, *P*, on the collection efficiency where *P* is the ratio of the area of intercepted radiation to the area of the collector surface. It is found that for values of *P* greater than 15 no glass cover plates should be used if the transmissivity of the glass was 0.91 or less. The effect of ambient air temperature on the collection efficiency is also shown.

A discussion of a *black body cover* to increase the effective absorptivity of the collector is presented. Theoretical calculations show that collection efficiencies can be increased with use of the cover. The effect of cover emissivity was found to be small if the cover is insulated. For an uninsulated cover the efficiency decreases with increasing cover emissivity.

During the past few years numerous technical articles have been published dealing with the utilization of solar energy for house heating. In general, these articles have dealt with the problems involved in the design and construction of flat-plate collectors. These collectors are not complicated and are fairly inexpensive to build. They are not equipped with any type of focusing or concentrating apparatus (Fig. 1).

The classical paper of Hottel and Woertz[1] published in 1942 was an analysis of the design and performance of flat-plate collectors. In 1955, H. Tabor at the First World Symposium on Solar Energy and Scientific Conference presented 2 papers[2,3] dealing with collector design with special reference to the principle of selective radiation (the possibility of producing a surface having a low effective emissivity which is also a good absorber of solar energy).

The principle involved in collector design is to construct a collector plate which will absorb the maximum amount of solar energy possible into the working fluid with a minimum loss to the environment. Hottel and Woertz made use of the greenhouse effect of plate glass and the insulating effect of 1 or 2 air spaces to reduce the loss to the environment. Tabor suggests the use of a collector plate whose surface has a low emissivity in the 3-25 μ range but which is a good absorber of solar energy. Materials with these properties are not readily available and much research is needed to perfect materials of this type. A third method of reducing this loss is to reduce the heat transfer area exposed to the environment but maintain the same amount of incident radiation by the use of a suitable concentrating reflector (Fig. 1); the collector temperature being maintained at a relatively low level.

A study of this third method of improving solar collection efficiencies

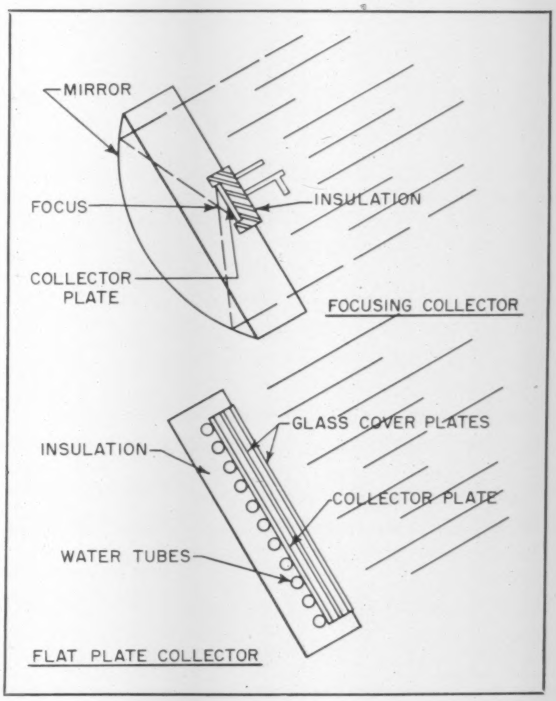


Fig. 1 — Focusing collector with collector mounted behind the mirror focus. Flat-plate collector with 2 glass cover plates

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**Chief Engineer, Applied Research Department, Temperature Controls Group, Minneapolis-Honeywell Regulator Co. Associate Member of ASHAE.

[1] Exponent numerals refer to References.

For presentation at the 64th Annual Meeting of the American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa., January 1958.

was undertaken during the summer of 1956, and experimental data were obtained using a surplus army searchlight reflector. The results of the study and the data obtained are presented herein.

Analysis

The energy balance for a solar collector under equilibrium conditions is:

$$\alpha\beta P Q_i = q_{eT} + q_{sT} \quad \ldots\ldots\ldots\ldots (1)$$

where

α = absorptivity of the collector plate.
β** = transmissivity or reflectivity of the focusing system or cover plates.
P = concentrating power — ratio of the area of intercepted solar radiation to the area of the collector surface.
Q_i = incident solar radiation, Btu per (hour) (square foot).
q_{eT} = energy loss to the environment by radiation, convection and conduction per unit area of the collector at temperature T, Btu per (hour) (square foot).
q_{sT} = rate of useful energy extracted from the collector at temperature T, per unit area of the collector, Btu per (hour) (square foot).

For a flat-plate collector $P = 1$. If the collector efficiency is defined as the ratio of the useful energy extracted from the collector, q_{sT}, to the energy incident on the collector, PQ_i,

$$\eta_T = \alpha\,\beta\,[1 - (q_{eT}/\alpha\,\beta\,PQ_i)] \quad (2)$$

where

η_T = collection efficiency at temperature, T.

The maximum efficiency of a collector is determined by its absorptivity, α, and the transmissivity, β, of the focusing system. From Equation 2 it is evident that the maximum efficiency can be approached by reducing q_{eT} or increasing P, or both.

The heat loss to the environment from a collector plate, assuming an average temperature for the collector, is:

$$q_{eT} = h\,(T_c - T_a) + \epsilon_c\,\sigma\,[T_c^4 - T_a^4] + U_b\,(T_c - T_a) \quad \ldots\ldots\ldots\ldots (3)$$

where

q_{eT} = energy loss to the environment per unit area of collector, Btu per (hour) (square foot).
h = convective film coefficient, Btu per (hour) (square foot) (Fahrenheit degree) [mainly a function of collector size and wind velocity].
T_c = collector temperature, Rankine.
T_a = environmental temperature, Rankine (Usually dry-bulb temperature of the air).
ϵ_c = emissivity of the collector surface.
σ = Stefan-Boltzmann constant.
U_b = back loss coefficient, Btu per (hr) (square foot of collector area) (Fahrenheit degree).

For a collector equipped with a glass cover plate q_{eT} is:

$$q_{eT} = h_s\,(T_c - T_g) + F\,\sigma\,[T_c^4 - T_g^4] + U_b\,(T_c - T_a) \quad \ldots\ldots\ldots\ldots (4)$$

and

$$q_{eT} = h\,(T_g - T_a) + \epsilon_g\,\sigma\,[T_g^4 - T_a^4] + U_b\,(T_c - T_a) \quad \ldots\ldots\ldots\ldots (5)$$

where

h_s = convective heat transfer coefficient for air space created by collector plate and glass cover, Btu per (hour) (square foot) (Fahrenheit degree).
T_g = glass temperature, Rankine.
F = radiant Interchange factor between two parallel surfaces, dimensionless $= 1/(1/\epsilon_c + 1/\epsilon_g - 1)$.
ϵ_g = emissivity of glass.
h = convective heat transfer coefficient from outermost plate to the environment, Btu per (hour) (square foot) (Fahrenheit degree).

For two glass cover plates an additional equation can be written for the heat loss. The first 2 terms in Equation 4 represent the heat transferred between the collector plate and the first glass cover and in Equation 5 the first 2 terms represent the heat transferred between the last glass

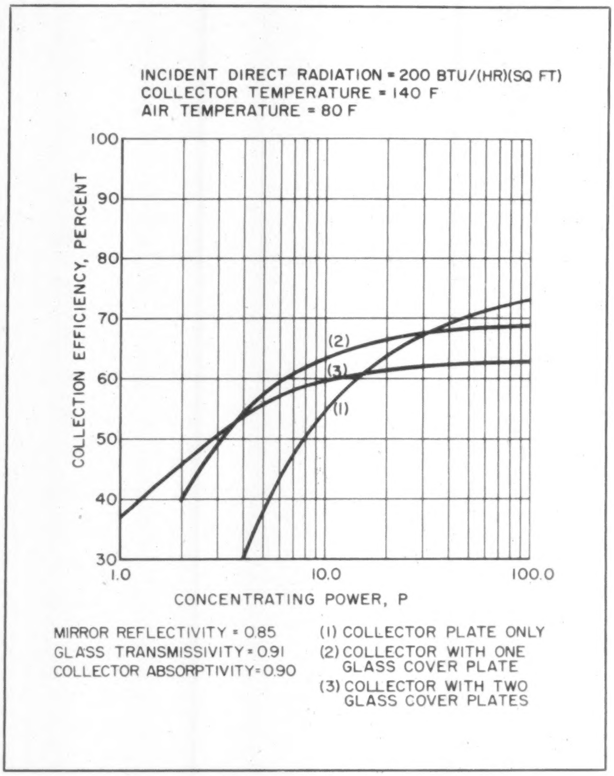

Fig. 2 — Calculated collection efficiencies of a solar collection system as a function of the concentrating power, P, constant receiving area of 19.6 sq ft

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**β is the mirror reflectivity for a mirror system or the transmissivity of the glass cover plates for a flat-plate collector or the product of the two if both are involved.

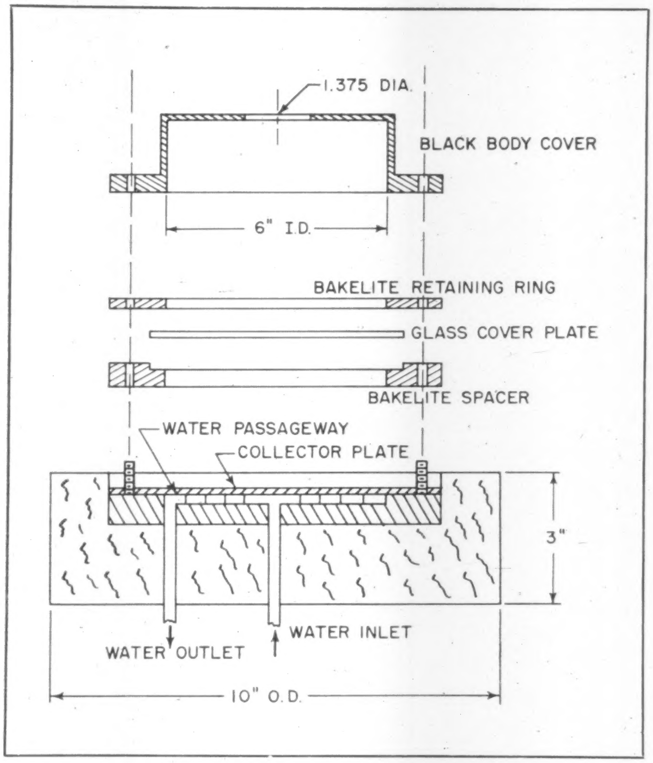

Fig. 3 — 6-in. diam collector used without cover, with 1 glass cover, or with black body cover

cover and the surrounding air. The third term in both cases is the back loss. For 2 glass covers an equation similar to Equation 4 could be written for the heat transfer between the first glass cover plate and the second or last plate. To determine the heat loss in the latter two cases, the equations are solved simultaneously to eliminate the unknown glass temperatures.

Using the equations just given, the collection efficiency for various values of P was calculated for a solar collector system having a constant receiving area of 19.6 sq ft. (Receiving area times the incident solar radiation gives the total solar energy entering the collecting apparatus). These results based on the following assumptions are shown in Fig. 2,

Collector temperature, 140 F.
Air temperature, 80 F.
Incident solar radiation, 200 Btu per sq ft.
Reflectivity of the mirror, 0.85.
Absorptivity of the collector, 0.90.
Transmissivity of the glass cover plate, 0.91.
Emissivity of the glass cover plate, 0.95.
Glass spacing, ⅛ in.

Overall coefficient of heat transmission U_b for the back loss, 0.194 Btu per (hr) (sq ft of collector area) (F deg).

Film coefficient of heat transfer h for the collector was calculated from the equation, given by Jakob, $N_{Nu} = 0.592\ R_e{}^{1/2}$ where $N_{Nu} = hL/K$, $R_e = VL\ \rho/\mu$. The radius of the collector is used as the characteristic length. Velocity of the wind was 10 mph.

Film coefficient of heat transfer h_s between the cover plates was calculated from the equation given by McAdams, $h_s = K/L$ where K is the conductivity of the air in the space. and L is the width of the space. The equation is valid for natural convection in sealed spaces for $N_{Gr}N_{Pr} < 10^3$ where N_{Gr} is the Grashof number and N_{Pr} is the Prandtl number.

The calculations show that a collector with 2 glass cover plates (low heat loss) has higher collection efficiencies up to $P = 3$, a collector with 1 glass cover plate is more efficient over the range $P = 3$ to $P = 15$ and a collector with no cover plate is more efficient for values of P greater than 15.

The maximum theoretical efficiencies obtainable are given in Table 1 and are presented to show the maximum values which would be attainable assuming the heat loss to the environment, q_{cT}, equal to zero. The values given in the second column are the asymptotes for the curves in Fig. 2.

The table shows the flat-plate collector to be theoretically superior if the heat loss is zero, due to the assumed 85 percent reflectivity of a suitable concentrating mirror. Practical considerations, as taken into account in Fig. 2, indicate that the focusing collector makes possible a much greater reduction in the heat loss than is possible with the flat-plate collector.

Table 1 — Maximum theoretical collection efficiencies[a]

Cover Plates	Flat Plate Collectors No Focusing System	Focusing Collector
None	0.900	0.765
One	0.819	0.696
Two	0.745	0.633

[a] Heat Loss = 0; collector absorptivity = 0.90; glass transmissivity = 0.91; reflection coefficient = 0.85.

Experimental Collector

Using a surplus army searchlight reflector as the focusing system, a solar collector was designed and built so that the value of P was 97. The receiving area of the system, equal to the area of the searchlight minus the area of the collector, was approximately 19.6 sq ft.

The collector (see Fig. 3) consisted of a collector plate of 6-in. diam which could be cooled by circulating water from the center to the outer edge through a spiral passageway. The front surface of the plate was painted black and later blackened further with acetylene soot. The edge and back of the collector were insulated with glass fiber insulation. The entire assembly was 10 in. in diameter and 3 in. deep.

The collector assembly was mounted in the 5-ft diam reflector and positioned so that the image completely filled the 6-in. diam collector plate (shown schematically in

Fig. 1). The plate was located either in front of or behind the focus of the mirror. Data were obtained with the plate in both positions, but as was expected no effects due to the position could be detected.

In using the collector, the searchlight mirror was directed at the sun and maintained in this position manually. Cooling water was pumped through the collector so that a temperature rise of approximately 5 F deg was maintained. The water temperature leaving the collector and the temperature rise were determined by means of thermocouples located at the inlet and outlet of the collector. The water flow rate was approximately 8 lb per min. A pyrheliometer, mounted on the searchlight shell, was used to determine the amount of total radiation received at the mirror. The total radiation and the sky radiation were determined directly and the direct radiation was determined from the difference of the two values. The amount of sky radiation was determined by shading the thermopile in the pyrheliometer from the direct rays of the sun and measuring the thermopile output.

The efficiency of the collector was calculated from instantaneous readings of flow rate, temperature rise, and the amount of direct radiation:

$$\eta = mC \; \Delta \; \mathrm{T}/Q_1 A_R \; \ldots\ldots\ldots (6)$$

where

m = flow rate, pounds per hour.
C = specific heat, Btu per (pound) (Fahrenheit degree).
$\Delta\mathrm{T}$ = temperature increase, Fahrenheit.
Q_1 = incident radiation (direct) Btu per (hour) (square foot).
A_R = receiving area, square feet = 19.6 sq ft.

No attempt was made to maintain a fixed inlet water temperature. Therefore, the collector temperature gradually increased during a particular day's run.

Data were obtained with the collector in front of and behind the focus, with and without a glass cover plate over a range of mean collector temperatures of 100 to 170 F on clear days (data taken only when sun was not covered by clouds). Some data were obtained on cloudy and partly cloudy days. The glass cover plates were cut from sheets of common window glass, 1/8-in. thick.

In an attempt to reduce the reflection and emission loss from the collector plate without reducing the radiation incident on the collector plate, a *black body cover*, shown in Fig. 3, was constructed. When mounted on the collector plate the cover had a 1.375-in. diameter opening located at the focus of the mirror. The collector plate was located behind the focus with the image of the sun filling the 6-in. diameter plate.

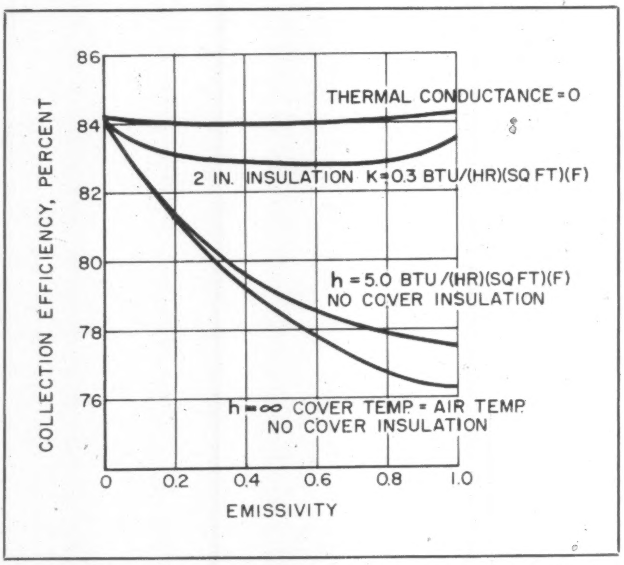

Fig. 4 — Effect of cover emissivity and cover insulation on collection efficiency using a black body cover. 6-in. diam collector plate in a 5-ft diam focusing mirror ($P = 97$); incident solar radiation = 300 Btu per (hr) (sq ft) (F deg); cover temperature, 140 F; cover emissivity, 0.9; air temperature, 80 F

A theoretical analysis of the *black body cover* was made considering the multiple reflections and emissions inside the cover assuming all reflections and emissions to be diffuse. From this analysis the collection efficiencies for the cover described were calculated to determine the effect of emissivity of the cover surface facing the collector and cover insulation. Calculated efficiencies are shown in Fig. 4 for a collector plate emissivity of 0.9, a collector plate temperature of 140 F and a solar intensity of 300 Btu per (hr) (sq ft). The geometry of the collector and collection system is assumed identical to that previously described. It is shown that theoretically the efficiency of the focusing collector can be increased with the use of a *black body cover*. If the cover is insulated, the cover emissivity has little effect on the efficiency but if the cover is not insulated, the cover emissivity should be low for maximum efficiency.

Results

The calculated efficiencies for the collector system on relatively clear days are given in Fig. 5. The amount of incident direct radiation varied from approximately 180 to 215 Btu per (hr) (sq ft). Efficiencies of about 55 percent were obtained with the collector equipped with a glass cover plate. Without a glass cover, efficiencies of about 65-73 percent were obtained and with the *black body cover* efficiencies of about 72 to 75 percent were obtained. The efficiencies compare favorably with theoretical values of 68.8 percent for a collector with one glass cover, 73 percent for a collector without a cover, and 81 percent for a collector with the *black body cover*. The theoretical efficiencies were calculated assuming a collector plate emissivity of 0.9 and a collector plate temperature of 140 F. The difference between the measured and calculated efficiency for the collector with one glass cover plate is believed due to the use of a 91 percent transmissivity for the glass and the experimental difficulties encountered in using the glass cover. The glass, 1/8-in. common window glass, had a tendency to break a short time after exposure to the sun and therefore the data were obtained during relatively short exposure periods.

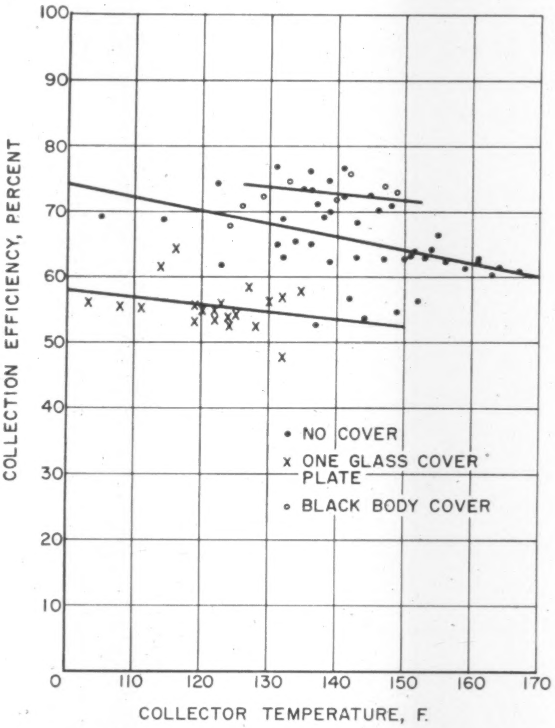

Fig. 5 — Collection efficiencies for a 6-in. diam collector mounted in a 5-ft diam parabolic mirror, concentrating power = 97

The effect of a variation in Q_i can be determined from Equation 2. Since Q_i varies from zero to some maximum value during a day, the efficiency of any solar collector will vary likewise. However, for the data presented in Fig. 5, the magnitude of the factors in Equation 2 is such that a variation of ± 10 percent produces a variation in the efficiency of only ± 0.85 percent. This is true only during that period of the day when Q_i is of about 200 Btu per (hr) (sq ft).

Analysis of the collector to determine the daily collection efficiency or the annual collection efficiency was not made at this time. This analysis requires knowledge of the daily radiation curves and daily temperature curves and requires numerous graphical integrations. For flat-plate collectors, Jordan and Threlkeld[4] give daily collector efficiencies for January 15, Lat. 42 deg North for collectors with 1, 2, and 3 glass cover plates for a clear day and for a partly cloudy day. For a clear day and a collector temperature minus air temperature difference of 60 F, they obtain a calculated daily efficiency of 56 percent.

Tabor[2] has calculated the annual collection efficiencies for various collectors, mostly of the flat-plate type. For a flat-plate collector with a mean temperature of 140 F, air temperature 70 F, he calculates an annual efficiency of approximately 55 percent.

An important quantity in the analysis of a solar collector is the so-called *cut-off* or *threshold* value for a particular collector. As can be seen from Equation 2, the collection efficiency will be zero for values of Q_i less than $q_{eT}/\alpha\,\beta\,P$ or:

$$Q_x = q_{eT}/\alpha\,\beta\,P$$

where

Q_x = cut-off intensity Btu per (hour) (square foot).

i.e. that value of Q_i below which the collector cannot reach temperature T, and no useful collection will be possible.

The calculated values of Q_x for a focusing collector, $P = 97$, and the calculated values of the heat loss to the environment, q_{eT}, for air temperatures of 0, 40, and 80 F as a function of collector temperature are given in Fig. 6.

Some representative values for the collection efficiencies calculated from

Table 2 — Representative values of experimental collection efficiencies on partly cloudy days[a]

Collector Temperature F	Useful Energy Btu/hr	Direct Radiation Btu/hr	Collection Efficiency Percent	Total Radiation Btu/hr	Collection Efficiency Percent
129.3	906	2065	43.9	3171	28.6
136.5	974	2010	49.0	3113	31.3
141.0	1573	2523	62.3	3747	41.9
150.2	1880	3300	57.0	4185	44.9
127.0 av.	494.6[b]	797[b]	62.2	1275[b]	38.8

[a] 6-in. diam collector in 5-ft diam parabolic reflector, $P = 97$. No glass cover, collector in back of the focus.

[b] Total energy for 20 min, Btu.

Note: The first 4 items were determined from instantaneous readings of temperature, water rate, and pyrheliometer output. The fifth item was determined from data obtained over a 20-min period during which time the useful energy obtained varied from 470 Btu per hr to 2640 Btu per hr.

data obtained on partly cloudy days are given in Table 2. In this case both the direct radiation intensity and the total (sky plus direct) radiation intensity were used to calculate the collection efficiencies and the 2 values are compared in Table 2.

It is noted that on clear days during the period of peak radiation intensities the sky radiation is approximately 10 percent of the total radiation, while on cloudy or overcast days the sky radiation is approximately 33 percent of the total radiation. Assuming that only a small portion of the sky radiation is effective in a focusing type collector, the clear day efficiencies are based on the intensity of the direct radiation. If comparisons are to be made with flat-plate collectors, the efficiency should be based on the total radiation especially if the comparison is to be made using data obtained on partly cloudy or cloudy days.

A disadvantage of the focusing collector is that it requires a heliostatic mounting which will keep the plane of the mirror at right angles to the sun's rays at all times. A flat-plate collector is usually a fixed device, orientated toward the south at the latitude angle from horizontal.

Conclusions

The collection efficiency of a solar collector has a maximum limit determined by the product of the absorptivity of the collector plate and the transmissivity of any focusing system or glass cover plates (Table 1).

By use of a focusing parabolic mirror these limiting efficiencies can be approached when the value of receiving area to collector area is 50 to 100 or higher, using a low collection temperature of about 150 F. The analysis shows that for values of P greater than 15 no glass cover plates should be used since a collector with no cover plates has the highest limiting efficiency, for glass transmissivities of 0.91 or less.

Collection efficiencies of 65 to 75 percent were obtained using a 6-in. diam collector mounted in a 5-ft diam surplus searchlight ($P = 97$) on clear days with collector temperatures from 100 to 170 F and air temperatures of approximately 80 F.

Efficiencies for the experimental collector on cloudy days varied considerably but were about 40 to 60 percent based on the intensity of the direct radiation and 30 to 45 percent when based on the intensity of the total radiation.

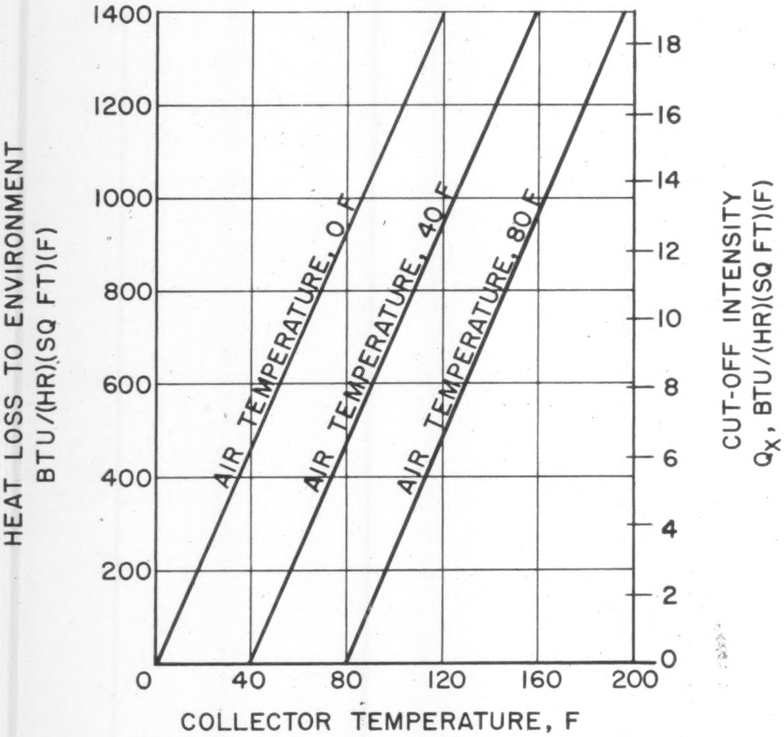

Fig. 6 — Calculated values of cut-off intensity and heat loss to the environment for a 6-in. diam collector ($P = 97$); $h = 10.6$ Btu per (hr) (sq ft) (F deg); $\epsilon = \alpha = 0.9$; $\beta = 0.85$; insulation thickness 1½ in.

Although the data were not conclusive, there was some indication that the *black body cover* reduces the heat loss to the environment and thereby tends to increase the collection efficiency. Theoretical analysis of the *black body cover* shows that the maximum theoretical efficiency, for the focusing collector system described in this paper, can be increased from 76.5 percent to 83 to 84 percent by using the cover. Cover emissivity is shown to have little effect on the efficiency if the cover is insulated. For an uninsulated cover, the cover emissivity should be low for maximum efficiency.

Acknowledgment

The authors wish to acknowledge the assistance of Willard Anderson and various other members of the staff at the Honeywell Research Center, Hopkins, Minn.

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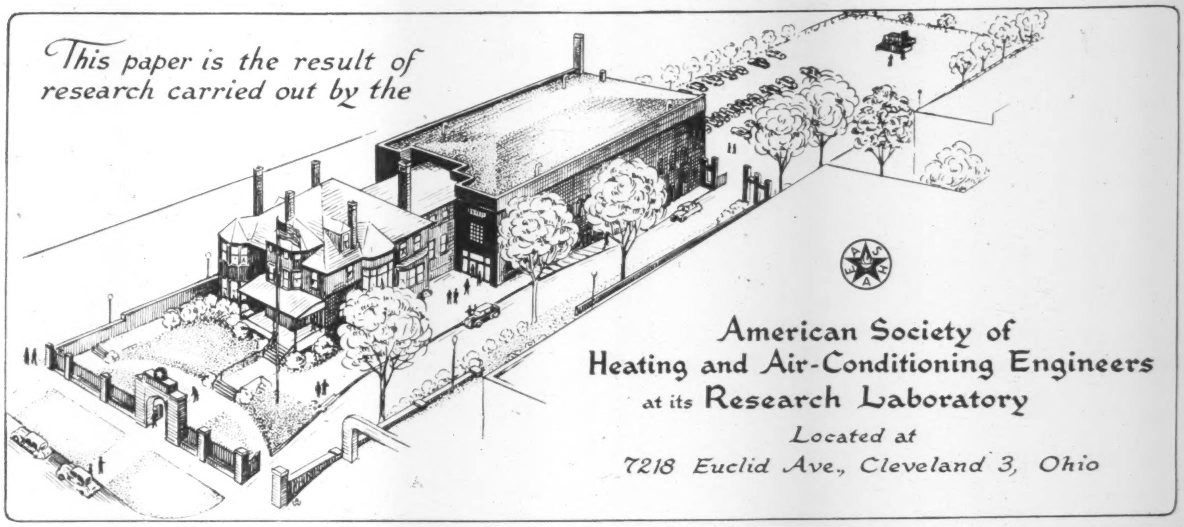
This paper is the result of research carried out by the
American Society of Heating and Air-Conditioning Engineers at its Research Laboratory
Located at 7218 Euclid Ave., Cleveland 3, Ohio

Lighting and Cooled Air Effects on Panel Cooling

By L. F. Schutrum* and T. C. Min**, Cleveland, Ohio

SUMMARY — Data showing the effects of conditioned air and fluorescent lighting on the performance of a cooled ceiling-panel were experimentally obtained in the ASHAE Environment Laboratory. A correlation of the ceiling panel heat removal, the conditioned-air rate and temperature, and the room surface and air temperatures was developed for one type of ceiling diffuser. The energy released from suspended direct and indirect fluorescent lighting fixtures is separated into visible radiation, low temperature radiation, and convection. The amount of heat removal by the cooled ceiling-panel under fluorescent lighting conditions is reported.

More than 20 percent of the energy supplied to fluorescent lights can be removed from a room by a cooled ceiling-panel at 70 F. This and other interesting observations were made in the Society's Environment Laboratory[1] where experimental work on panel cooling was in progress from the middle of 1954 until early in 1956, under the guidance of the TAC on Panel Heating and Cooling.

An earlier paper[2], published in January, 1955, presented data on the heat removed by a cooled ceiling-panel when the only heat sources were the warm walls and floor of the room, and warm infiltration air. This paper presents the results of later studies made to determine the effects of chilled air introduction and direct and indirect fluorescent lighting on the heat pickup of a cooled panel. Ninety-five tests were made to obtain the information reported here. In one test, 8 staff members occupied the room; in all others, the room was unoccupied, and therefore, no latent heat load existed. In all tests, the room was unfurnished.

Test Room

All 6 surfaces of the room[2] were composed of aluminum panels through which liquid at any desired temperature could be circulated. Surface temperatures were measured by copper-constantan thermocouples. Heat flows into or out of the surfaces of the room were measured by plate-type heat-flow meters[3] fastened to the room side of the aluminum panels. The ceiling was painted white, the walls green, and the floor gray. The room was 25 ft × 12 ft, with a ceiling which could be adjusted in height up to 12 ft. Conditioned air entered the room through two 8-in. ceiling diffusers and left through a slot between one wall and the floor. The quantity of air was metered by an orifice, and provision was made for introducing moisture into the conditioned air to maintain a relative humidity of 50 ±10 percent.

All test data were taken under steady-state conditions. In most tests, the floor and the 4 walls were maintained at the same selected uniform temperature between 70 and 95 F, thus creating a so-called *uniform environment*. This uniform environment temperature is also referred to as the AUST (area-weighted average uncooled surface temperature). The

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[1]Exponent numerals refer to References.
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entire ceiling was also held at some selected uniform temperature from 60 F to 85 F.

Effects of Introducing Cooled Air

The exact quantitative effects of cool air introduction on the performance of a cooled ceiling-panel may vary, depending upon location, type and adjustment of the air distributing device used. In the tests reported herein, air was supplied through two 8-in. ceiling diffusers located at the approximate centers of the 2 halves of the room, and adjusted to distribute the air horizontally. The diffusers extended approximately 2 in. below the ceiling, and the air stream did not immediately attain close contact with the ceiling. The size and adjustment of the diffusers were such that the throw of the air stream was less than the diffuser-to-wall distance at all air flow rates less than 2.1 cfm per sq ft of floor area.

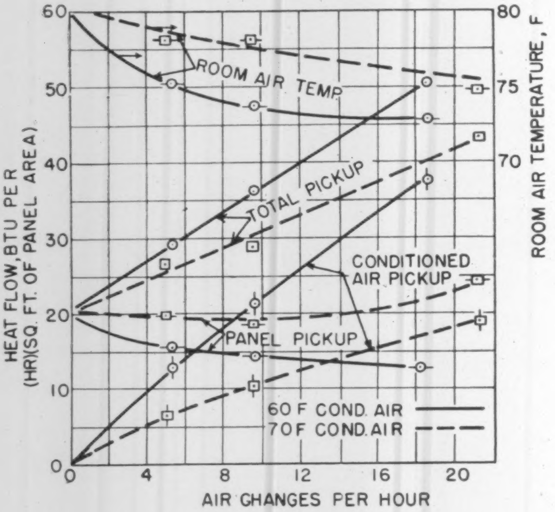

Fig. 1 — Effect of conditioned-air supply rate and temperature on heat removal by panel and air (ceiling 70 F, AUST 85 F, 8-ft ceiling height)

Conditioned air was supplied at temperatures from 60 F to 75 F, and in quantities up to 21 air changes per hour (about 2.8 cfm per sq ft of floor area for an 8-ft ceiling height). The relative humidity in the room was held between 40 and 60 percent, and for this part of the study, the room was unoccupied and unlighted.

Fig. 1 shows the observed effects of cool air introduction to a room having a uniform environment of 85 F and a cooled ceiling-panel at 70 F. Note that the heat pickup by the cooled air increased as the air quantity increased and as its temperature decreased. The heat pickup by the cooled panel remained relatively constant when the temperatures of the cooled air and the panel were the same, regardless of the air volume. However, in tests where the entering air temperature was below the panel temperature, the panel heat pickup decreased as the air volume increased.

The combined heat removal of the air and panel, and the resulting room air temperatures are also shown in Fig. 1.

The panel heat pickup curves of Fig. 1 have been replotted in Fig. 2 and their convective and radiative components are shown. The calculated[4] radiant component is shown to be about 13.7 Btu per (hr) (sq ft) for the indicated surface temperatures. The convective component was determined by subtracting the radiant component from the observed total. As shown in the figures, when air at 70 F was supplied the cooled panel picked up an appreciable quantity of convected heat at all air-flow rates. However, when the temperature of the conditioned air was reduced to 60 F, the pickup of convected heat reduced rapidly as the air-flow rate increased, and became negative at about 13 air changes per hour.

The data reported in Figs. 1 and 2 were determined for an 8-ft ceiling height. Tests were repeated at 9½-and 11½-ft ceiling heights, and no significant changes in panel performance were found.

For a few tests, the diffusers were adjusted to direct the air vertically downward, and an appreciable increase in the heat pickup of the panel was noted. With conditioned air entering at 60 F, the panel heat pickup was approximately the same as shown in Fig. 2 for a 70 F conditioned-air temperature.

Heat transfer to a cooled surface by convection is usually calculated by the equation

$$q_c = h_c\ (t_a - t_p)\ \ldots\ldots\ldots\ldots\ (1)$$

where

h_c = coefficient of heat transfer, Btu per (hour) (square foot) (Fahrenheit degree) based on $(t_a - t_p)$.
t_p = surface temperature, Fahrenheit.
t_a = room-air temperature, Fahrenheit.

In the case of a cooled ceiling-panel, with cooled air being distributed across it horizontally from a ceiling diffuser, Equation 1, with the foregoing definition of symbols, was not applicable. The room-air temperature differed considerably from the temperature of the cool air flowing across the ceiling, and, at times, the measured heat flow to the ceiling would be zero or negative in spite of a positive difference between the room-air and panel temperatures.

As explained in the Appendix[†], a second equation of the same form as Equation 1 was written,

$$q_c = h_e\ (t_e - t_p)\ \ldots\ldots\ldots\ldots\ (2)$$

but the symbols were defined as follows:

t_e = equivalent film temperature, Fahrenheit.
h_e = equivalent coefficient of heat transfer, Btu per (hour) (square foot) (Fahrenheit degree) based on $(t_e - t_p)$.

With Equation 2, a zero value of $t_e - t_p$ indicated zero heat transfer. In other words, the equivalent film temperature is the same as the surface temperature when no heat flow occurs through the surface. By this concept, the equivalent film temperatures and equivalent coefficients of heat transfer were determined and correlated in terms of the AUST, the entering air temperature, and the rate of air supply. By substituting these values in Equation 2, it was possible to calculate the convection heat pickup by the ceiling panel for a variety of conditions. The radiant heat pickup for the same conditions was calculated by the Stefan-Boltzmann law.

[†] It is planned to include the Appendix with this paper in the TRANSACTIONS.

In Fig. 3, the calculated heat pickup by the ceiling panel is plotted against the rate of flow of cooled air supply and the rate of heat removal by it, for various differences between room-air and ceiling-panel temperatures. The figure is based upon data obtained in tests in which the only heat gain to the space was from the warm floor and walls. However, the application of the figure to the solution of problems involving internal loads will be demonstrated later in the paper. The figure is for a supply air temperature of 60 F. It should be pointed out that the relationships shown in Fig. 3 are those observed in the Environment Laboratory. Application of the figure to other spaces has not been verified.

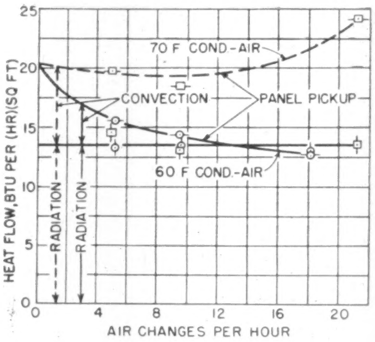

Fig. 2 — Radiation and convection components of total panel heat pickup (ceiling 70 F, AUST 85 F, 8-ft ceiling height)

Note that for a given difference between room air and ceiling temperatures, heat removal by the panel is greater at higher rates of air flow. It was shown in a previous paper that when the only heat gain to the space was from the warm floor and walls, a cooled ceiling-panel could pick up approximately 2 Btu per (hr) (sq ft) (deg difference between the room-air and panel temperature). If the heat gain is greater than this, the room temperature can be held constant only by the introduction of cooled air. For such a condition, the following equation, based upon the curves of Fig. 3 for 5 and 10 deg temperature differences, can be written to express the approximate heat pickup by the panel:

$$q_p = 2\ (t_a - t_p) + 0.3\ [1.08\ C\ (t_a - t_{ca})] \qquad (3)$$

where

q_p = heat pickup by the ceiling panel, Btu per (hour) (square foot).

t_a = room-air temperature at the 60 in. level, Fahrenheit (limited to 75 to 85 F).

t_p = panel-surface temperature, Fahrenheit (limited to 70 to 75 F, but lower than t_a).

t_{ca} = conditioned-air temperature, Fahrenheit (limited to 60 to 70 F).

C = rate of conditioned air supply, cfm per square foot of floor area (range 0 to 1.0).

The first part of Equation 3 is the previously reported heat pickup of 2 Btu per (hr) (sq ft) (deg temp difference). The second part indicates an additional heat pickup by the panel amounting to 30 percent of the heat removed by the cooled air.

The following example illustrates the use of Fig. 3.

Example 1:

Given: *Room-air temperature — 75 F; panel-surface temperature — 70 F; heat gain from walls and floor — 12 Btu per (hr) (sq ft of panel area).*

To find: (1)*the amount of 60 F air required to maintain the specified conditions;* (2) *The heat removed by the ceiling panel;* (3) *The heat removed by the conditioned air.*

Solution: The difference between the room-air and ceiling temperature is 5 deg. Follow along the line for 5 deg temperature difference until the sum of the heat pickup by the panel, as read at the left, plus the heat pickup by the air, as read on the 75 F line at the bottom, is 12 Btu per (hr) (sq ft). This condition is satisfied at an air supply rate of 0.12 cfm per sq ft of floor area, and the heat removal by the panel and air are 10 to 2 Btu per (hr) (sq ft of panel area) respectively.

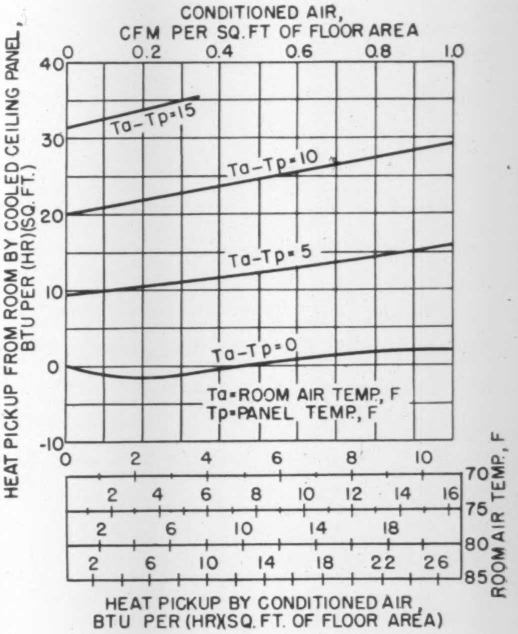

Fig. 3 — Heat pickup by cooled ceiling-panel and conditioned air at 60 F (8-ft ceiling height)

Effect of Internal Convective Heat Sources

The effect of low-temperature convective heat sources on the performance of a cooled ceiling-panel was reported in the previous paper[2]. Another series of tests was made to determine the combined effect on panel performance of such heat sources and cooled air introduction.

As in the previous case, each heater consisted of a 500-w incandescent lamp shielded by concentric, 2-ft long sections of 8-in. and 10-in. galvanized duct. Each heater was supported vertically, with the bottom end of the sheet metal about 12-in. above the floor. Baffles at the top and bottom prevented radiation directly from the lamp to the room surfaces, but permitted free circulation of air through the device. When operating, the temperature of the outer cylinder was less than 100 F, and calculations indicated that at least 95 percent of the total heat output was by convection.

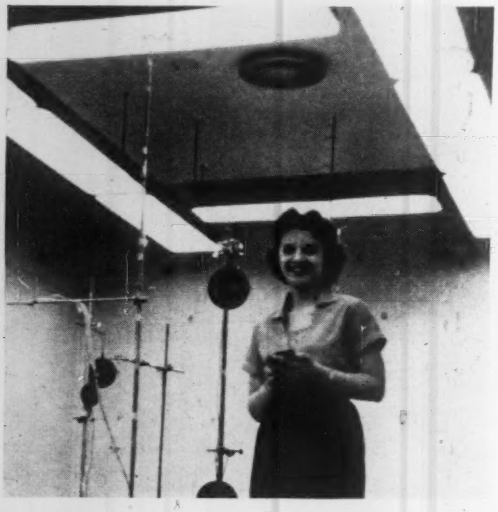

Fig. 4 — Interior of Environment Laboratory showing arrangement of fixtures for direct lighting

As would be expected, when an internal convective heat load was added, the room-air temperature increased. As a result of this temperature rise, the combined increases in the heat pickup by the panel and the conditioned air were sufficient to remove this additional convective load.

If the room-air temperature is to be held constant when an internal convective load is added, the ceiling temperature must be decreased, or the conditioned-air quantity must be increased or its entering temperature decreased. If the ceiling and entering air temperatures are held constant, the ceiling heat pickup will remain essentially constant and practically all of the additional internal convective load must be removed by increasing the quantity of conditioned air.

Example 2: Assume in Example 1 *that the room-air, panel-surface, and entering-air temperatures, and the heat gain from warm surfaces remain as stated. Also assume an additional internal convective load of 5 Btu per (hr) (sq ft of panel area). Determine the quantity of conditioned air required, and the heat picked up by the air.*

Solution: In this case, the heat removal by the panel will be the same as in *Example* 1, or 10 Btu per (hr) (sq ft). The heat removal by the conditioned air will be 17 − 10 or 7 Btu per (hr) (sq ft of panel area). From Fig. 3, it is found that this heat removal from a 75 F room with 60 F entering air will require 0.43 cfm per sq ft of floor area.

Effect of Fluorescent Lighting

To determine the effect of lighting on the heat pickup by a cooled ceiling-panel, 13 RLM Type 6[5] fluorescent fixtures were installed in the Environment Laboratory. The fixtures were first installed as shown in Fig. 4, to provide direct lighting. Later they were inverted to throw the light upward and provide indirect lighting. In both cases the fixtures were installed with the center lines of the tubes 18 in. below the ceiling.

Each fixture held three 40-w standard cool-white fluorescent tubes, and the ballast in each fixture had an average full load loss of 23 w. Thus the normal rating for the tubes and ballast in each fixture was 143 w, and the total for the 13 fixtures was 1859 w. This is equivalent to approximately 6 w per sq ft of floor area.

Table 1 — Short wave (light) energy absorbed by room surfaces radiation from thirty-nine 40-watt fluorescent tubes, type RLM-6 fixtures

Room surfaces	Type of Lighting					
	Direct			Indirect		
	Btu per (hr.) (sq ft)	Btuh	percent	Btu per (hr.) (sq ft)	Btuh	percent
North Wall	0.39	46	8	0.25	29	5
South Wall	0.39	46	8	0.25	29	5
East Wall	0.39	96	16	0.25	61	10
West Wall	0.39	96	16	0.25	61	10
Floor	0.96	387	49	0.39	116	19
Ceiling	0.07	21	3	1.05	316	51
TOTAL		592	100		612	100

Power to the lights was supplied through a variable transformer which was adjusted to maintain approximately 118 volts at the fixtures throughout the tests. In spite of this control, the wattage to the lights did not remain constant. This was probably due to 2 factors, (1) the characteristic of fluorescent lamps to vary the current flow with variations in bulb-wall temperature, and (2) slight inaccuracies in voltage control. Wattages or their Btuh equivalents given later in the paper are those determined for specific test conditions, unless otherwise indicated. The average lamp-wall temperatures, with fixtures mounted for direct and indirect lighting, were approximately 125 F and 110 F, respectively.

Light output of a fluorescent lamp also varies considerably, depending upon tube temperature. The effect of ambient-air temperature and air movement on the relative light output of bare fluorescent lamps is given in Fig. 1 of Reference 6. The average level of illumination in the test room 30 in. above the floor, was 185 ft-candles for direct lighting, and 82 ft-candles for indirect lighting. These readings were taken with a multicell color-and-cosine-corrected light meter. Fluorescent-tube and fixture surfaces were dusted weekly to assure uniform test conditions.

All of the electrical energy supplied to the lights was dissipated as heat by some combination of the following methods:

1. Radiation to the room surfaces;
2. Radiation to the carbon dioxide and water vapor in the room air;

3. Convection from the warm lamp and luminaire surfaces to the room air;
4. Conduction through the supporting members.

The low temperature radiation absorbed by the carbon dioxide and water vapor in the air was calculated by use of Reference 7, and was found to be unimportant. Gaseous absorption in the visible wavelengths is practically non-existent.[8] Heat conduction through the fixture supports was found to be insignificant. Therefore, for practical purposes, all of the heat transfer from the lights may be accounted for by radiation to the room surfaces or by convection to the room air.

Table 2 — Distribution of energy from fluorescent lights to room surfaces and air

Type of Lighting	Energy Input to Lights Btuh	Energy Release from Fluorescent Lights, Short Wave (Lights) Radiation[a]	Percent Low Temperature Radiation	Convection
	Ceiling 70 F, Walls & Floor 80 F, 5 Air Changes at 60 F			
Direct	6150	9.6	31.9	58.5
Indirect	6467	9.5	21.5	69.0
	Range of Values for Various Test Conditions			
Direct		9.0 - 9.8	24.3[b] - 39.0[c]	51.6[c] - 66.4[b]
Indirect		8.9 - 9.7	14.8[b] - 24.1[d]	66.4[d] - 75.6[b]

[a]Assumed constant for all tests; [b]10 air changes per hour; [c]75 F conditioned air; [d]No conditioned air.

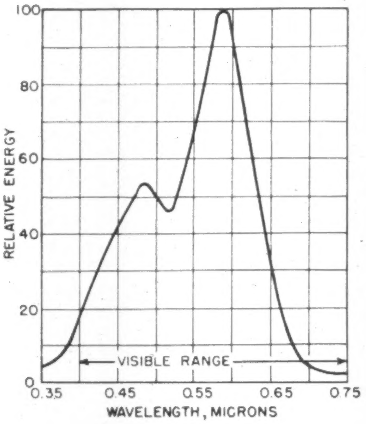

Fig. 5 — Spectral energy distribution of standard cool white fluorescent lamp. Mercury lines 0.4047, 0.4358, 0.5461, and 0.5780 microns are excluded (from Reference 9)

Table 3 — Pickup of radiant energy from fluorescent lighting by ceiling panel at 70 F

Type of Lighting	Energy Input to Lights Btuh	Radiation Absorbed by Panel: Short Wave (Light) Btuh[a]	Short Wave (Light) Percent of total input to lights	Long Wave (Low Temperature) Btuh	Long Wave (Low Temperature) Percent of total input to lights
	Walls & Floor 80 F, 5 Air Changes (0.79 cfm per sq ft) at 60 F				
Direct	6150	21	0.3	938	15.3
Indirect	6467	316	4.9	866	13.4
	Range of Values for Various Test Conditions				
Direct		21	0.3	507 - 1209	8.3 - 19.7
Indirect		316	4.9	526 - 1054	8.1 - 16.3

[a]values from Table 1

The portion of the radiant energy from the lights which can be absorbed by the room surfaces depends upon the spectral distribution of the radiation at its source, and the absorbing characteristics of the surfaces. The spectral curve for the short-wave, high-temperature radiation from a 40-w standard cool-white fluorescent lamp is given in Fig. 5. This does not include the long-wave, low-temperature radiation given off by the warm surface of the tube. It will be noted from Fig. 5 that nearly all of the high-temperature radiation from the lamp is in the visible range.

The ceiling of the test room was painted with an off-white oil paint. The reflectance of this paint at various wavelengths, as determined by a recording spectrophotometer, is shown in Fig. 6. Absorptance of the surface for a given wavelength is determined by subtracting the reflectance for the wavelength from 1.00. Absorptance of the ceiling for the short wave radiation emitted by the lights, as obtained by an integration of the emitted energy (Fig. 5) and the ceiling absorptance (Fig. 6), was found to be 32 percent.

To learn more about the heat dissipation from the lamps, tests were made to measure the visible or short-wave radiation to each of the room surfaces. To accomplish this, the output of the heat-flow meters on one surface of the room was connected in series with a potentiometer which could supply an equal potential having opposite polarity. Any unbalance in the 2 voltages was then fed through an amplifier and read on an indicator. The lights were turned on and operated until temperature equilibrium was obtained, and the potentiometer was adjusted until the indicator showed no unbalance in the opposing voltages. When the lights were turned off, the high-temperature radiation stopped instantly, and the resulting drop in the heat-flow meter output was read. The reading was taken before the fixtures had cooled appreciably, but was delayed enough to allow the meters to respond.

The described measurements were made for each of the 6 room surfaces, for both direct and indirect lighting. Results are shown in Table 1. Note that the relative absorption of short-wave radiation by ceiling and floor differ widely for direct and indirect lighting. High-temperature radiation exchange between lights and room surfaces does not change appreciably with normal changes in surface temperature. The values shown in Table 1 were therefore judged to be applicable to all tests.

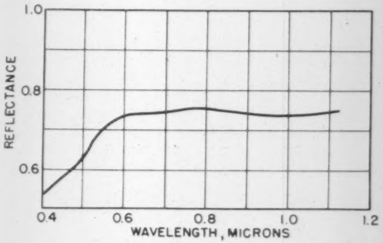

Fig. 6 — Spectral reflectance of white ceiling paint

In addition to short-wave radiation directly from the light source, there was an appreciable amount of long-wave, or low-temperature radiation emitted from the surfaces of the tubes and from the warm surfaces of the fixtures. This low-temperature radiation may be arbitrarily defined[10] as radiation to which glass is opaque. Its wavelength is therefore greater than 4 to 5 microns.

The low-temperature radiation from a single[a] 3-tube fixture was studied in the test room and a method of calculating this component of the heat exchange was developed, and is described in the Appendix.

With the 2 parts of the radiation component available, either by measurement or calculation, the convection component of heat transfer from the lights was determined for each test by subtracting the total radiation component from the total energy supplied to the lamps. The convective heat transfer obtained by this method was checked by making a convection heat balance on the room, *i.e.*, the convected heat added to the room from the surfaces and from the luminaires, must equal the convection loss to the room surfaces and to the conditioned air. The results obtained by the 2 methods differed by less than 5 percent for all but one of the 20 tests.

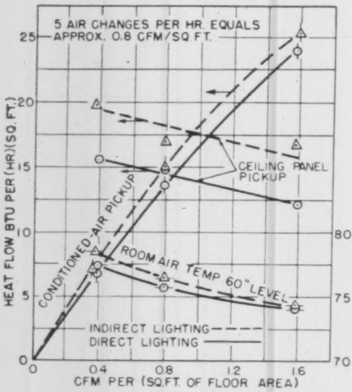

Fig. 7 — Effect of conditioned-air supply rate on heat pickup by cooled ceiling panel and conditioned air; (fluorescent lighting 6-w per sq ft, ceiling 70 F, AUST 80 F, conditioned air 60 F, 10-ft ceiling height)

Table 4 — Approximate distribution of lighting load for determining heat pickup by panel and conditioned air, percent

Type of Lighting	Convection[a]	Radiation to Panel[b]	Radiation to Other Surfaces[c]
Direct	60	16	24
Indirect	70	18	12

[a] Values from Table 2; [b] Sum of high- and low-temperature radiation from Table 3; [c] Obtained by subtracting sum of convection and radiation percentages from 100.

The distribution of energy transferred from the lights to the room is given in the upper part of Table 2 for a specific set of room conditions. The percentages of the high-temperature radiation to the room surfaces were calculated from the totals in Table 1, and are approximately the same for direct and indirect lighting. As might be anticipated, the convection was somewhat less with the reflector turned downward for direct lighting, than in the inverted position of the indirect luminaire.

The lower part of Table 2 gives the range of values obtained under various test conditions and the numerical values would undoubtedly vary for different types of fixtures.

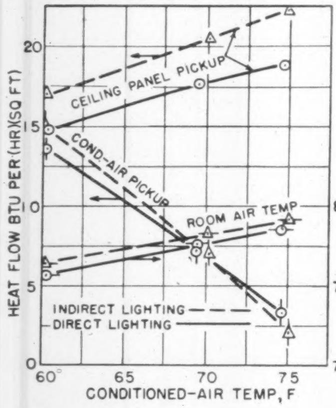

Fig. 8 — Effect of inlet air temperature on heat pickup by cooled ceiling panel and conditioned air; (fluorescent lighting 6-w per sq ft ceiling 70 F, AUST 80 F, 0.8 cfm per sq ft 5 air changes per hr 10-ft ceiling height)

Pickup of Heat from Luminaires by Cooled Ceiling-Panel

Of primary interest to the engineer is the amount of heat from the lights that can be absorbed and removed by a cooled ceiling-panel. The upper part of Table 3 presents data on the radiation from the luminaires to the panel for 2 specific tests. These are the same 2 tests for which data are given in Table 2. The second part of Table 3 shows the range of values determined in other tests for other air change rates and inlet air temperatures.

Figs. 7, 8, and 9 show the effects of 3 different variables on the heat removed from the test room by the cooled panel and by the conditioned air. The sources of the heat were the warm wall and floor surfaces and the fluorescent lights. Results are given for both direct and indirect lighting systems.

Fig. 7 shows that as the volume of conditioned air increases, the heat pickup by the panel decreases, and the heat removal by the conditioned-air increases. It is evident from Fig. 8, that the panel pickup increases and the heat removal by the air decreases as the supply-air temperature increases.

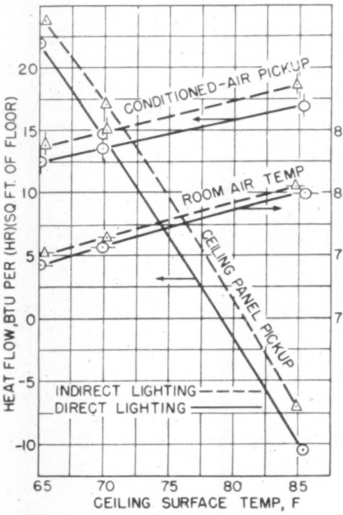

Fig. 9 — Effect of ceiling surface temperature on heat pickup by cooled ceiling panel and conditioned air; (fluorescent lighting 6-w per sq ft AUST 80 F, conditioned air 60 F, 10-ft ceiling height)

Fig. 9 shows that as the panel-surface temperature increases, the heat removal by the conditioned air increases, and the heat pickup by the panel shows a rapid decrease. At surface temperatures above about 80 F, the panel adds heat to the space.

It is interesting to note that in each of Figs. 7, 8, and 9, the heat removal by both the panel and the conditioned air is greater for indirect than for direct lighting, but that in spite of this, the room-air temperature is higher with indirect lighting. This unusual relationship is the result of two factors: (1) the energy input was slightly higher for indirect than for direct lighting, and (2) the major part of the radiation from the direct lighting fixtures fell on the warm floor and wall surfaces, and while their temperature was increased somewhat, the total heat release from these surfaces to the cooled panel and the room air was less than the sum of the radiation received from the lights and the release which would have taken place from the surfaces at their normal temperatures. Baker[11] and others have indicated that absorption of radiant energy by the enclosure surfaces causes a higher inside-surface temperature and, therefore, reduces the heat gain by conduction.

The effect of the rate of supply of conditioned air on the various components of heat pickup of a cooled panel is shown in Fig. 10. As might be expected, radiant components are relatively unaffected by the conditioned air, but the convection component decreases as the air delivery rate increases.

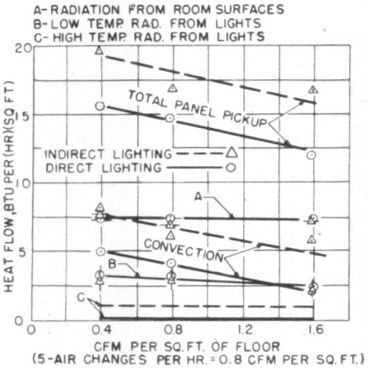

Fig. 10 — Effect of conditioned-air supply rate on components of ceiling panel heat pickup; (ceiling 70 F, AUST 80 F, conditioned-air 60 F, fluorescent lighting 6-w per sq ft, 10-ft ceiling height)

In a room such as the Environment Laboratory, where heat is supplied from warm building surfaces and a lighting system, and cooling is accomplished by a cooled ceiling and conditioned air, the heat exchange which takes place is the result of many interrelated factors. Although precise determinations would be extremely difficult, Fig. 3 may be used to predict the approximate heat removal by the panel and the conditioned air, over the range of conditions studied. The method of solution may be summarized as follows:

1. The normal heat gain through the room surfaces plus the radiation from the lights which falls on the floor and walls, may be treated as described in *Examples* 1 and 2 for the heat gain from the wall surfaces.
2. The convection heat gain from the lights may be considered an internal convective load and treated as described in *Example* 2.
3. The total radiation from the lights to the panel may be added to the panel pickup as determined from Fig. 3.

An approximate distribution of lighting load suggested for use in making a solution by means of Fig. 3, is given in Table 4. The values in this table are based on a ceiling temperature of 70 F, floor and wall temperatures of 80 F, and 5 air changes per hour at 60 F. A 5 F deg increase or decrease in the ceiling temperature, will cause a decrease or increase of approximately 2 percent respectively in the low temperature radiation exchange between the luminaires and the ceiling.

Example No. 3: **Given:** *room air temperature = 75 F; panel surface temperature = 70 F; heat gain from walls and floor = 12 Btu per (hr) (sq ft of panel area); load from direct fluorescent lights = 15 Btu per (hr) (sq ft of panel area)*

To find: (1) *heat removed by the cooled panel;* (2) *amount of 60 F air required to maintain the required conditions; and* (3) *amount of heat removed by the conditioned air.*

Solution: Using the values from Table 4, the following lighting load components may be determined: Convected heat releases = 0.6 × 15 = 9 Btu per (hr) (sq ft); Radiation to panel = 0.16 × 15 = 2.4 Btu per (hr) (sq ft); Radiation to other surfaces = 0.24 × 15 = 3.6 Btu per (hr) (sq ft); The sum of the heat gain from the walls and floor, and the radiation from lights to other surfaces = 12 + 3.6 = 15.6 Btu per (hr) (sq ft); The difference between the room air and the ceiling panel temperature is 5 F deg.

Follow along the $t_a - t_p = 5$ curve on Fig 3 until the sum of the heat pickup by the panel, as read at the left, and the heat pickup by the air, as read at the bottom, is 15.6. This condition is satisfied at an air supply rate of 0.29 cfm per sq ft, and the heat removal by the panel and the air are 10.9 and 4.7 Btu per (hr) (sq ft) respectively.

The air supply must be increased sufficiently to remove the additional 9 Btu per (hr) (sq ft) of convected heat from the lights. Therefore, the total required heat removal by the air must be 9 + 4.7 = 13.7 Btu per (hr) (sq ft), and from Fig. 3, this will require 0.85 cfm per sq ft of floor area.

The total heat removal by the panel will be the 10.9 Btu as just determined from Fig. 3 plus 2.4 Btu direct radiation to the ceiling, or 13.3 Btu per (hr) (sq ft) of panel area.

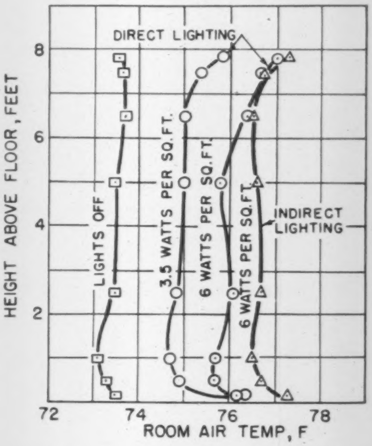

Fig. 11 — Effect of lighting load on room-air temperature gradients; (ceiling 70 F, AUST 80 F, conditioned-air 0.8 cfm per sq ft at 60 F, 10-ft ceiling height)

Room-Air Temperature Gradients

The room-air temperature gradient curves shown in Fig. 11 were plotted from temperatures taken at the center of the room with No. 36 copper-constantan butt-soldered thermocouples. These were not appreciably affected by radiation, as verified by comparison with an aspirated thermocouple.

With the room-surface temperatures held constant, the room-air temperatures increased as the lighting load increased. The increase near the floor and ceiling was particularly pronounced. Variations in room-air temperature caused by internal convection heaters were about the same as those shown in Fig. 11 resulting from fluorescent lighting.

It will be noted that Fig. 11 indicates a higher room-air temperature for indirect than for direct lighting. This is in agreement with the data plotted in Figs. 7, 8, and 9.

Removal of Heat from Occupants

One test was made with 8 people in the room, to study the effect of the heat load thus provided, on the heat pickup by the panel. Another test was made with an empty room having identical surface temperatures. The room air temperature was somewhat higher in the test with the occupants because of the heat given up by them. A comparison of results showed that the cooled ceiling-panel picked up approximately 25 percent of the sensible heat output of the occupants. The sensible heat output of the occupants was obtained by an energy balance on the room, and amounted to an average of 229 Btu per (hr) (person). The combined sensible and latent heat loss per person was 438 Btu per (hr).

Additional research must be done before definite conclusions can be drawn on the subject of human occupancy *vs.* panel heat pickup.

Discussion

Much of the research which has been published on the thermal performance of lighting systems in conjunction with air conditioning has dealt with incandescent lighting.

The pioneering work of Leopold[12] introduced the concept of an independent-radiation-transfer, (IRT) which is equivalent to the sum of the low- and high-temperature-radiation transferred to the ceiling, as given in Table 3. Leopold's values of IRT are 1.5 and 3.1 percent for 6 single-tube fluorescent lights, and 12.5 percent for 4-tube fixtures. For comparison, the average values from Table 3 for direct and indirect lighting are 15.6 and 18.3 percent. The data for both studies were obtained with essentially the same room-surface temperatures, but with different air introduction and different fixtures.

The radiant energy emitted from fluorescent lighting is essentially in the visible range of wavelengths (0.4 to 0.75 microns), and in a second range of 2 microns and longer. Very little energy occurs in the ultraviolet range (below 0.4 microns) and in the band between 0.75 and 2 microns. Paint for a cooled ceiling panel should therefore be a good reflector in the visible range to improve illumination, and should have high absorptivity for low-temperature radiation. Fortunately, most paints which have high light reflectance also have good absorption characteristics for longer wavelengths. A high absorptance in the 0.75 to 2 micron range would be helpful for solar radiation or for incandescent lighting, but would have little value with fluorescent lighting.

Conclusions

The test data and results presented here were obtained in the Environment Laboratory under the specified test conditions. Their application to other spaces at other conditions has not been verified, and the reader is cautioned against their indiscriminate use. However, it is believed that the trends here indicated may serve as a guide in predicting the performance of panel cooling installation.

1. The heat pickup by a cooled ceiling-panel and conditioned air may be summarized as follows: *(a)* The sum of normal heat gain through the room surfaces plus the radiation from lights which falls on the walls and floor is removed in part by the panel and, in part, by the conditioned air, and the division may be determined by Fig. 3, or by Equation 3 of the paper; *(b)* The convection heat gain from the lights is removed almost entirely by the conditioned air system and may be added to the convected load as determined in *(a)*; *(c)* the radiation from the lights to the panel can be added to the panel pickup as determined in *(a)*.

2. For the particular fixtures used in this study, approximately 10 percent of the energy supplied to the direct lighting system was radiated in the visible wavelengths, 32 percent was emitted as long-wave radiation, and 58 percent was transferred to the room air by convection. For indirect lighting, these values were 10 percent visible radiation, 21 percent long-wave radiation, and 69 percent convection.

3. Approximately 16 percent of the energy input to the direct fluorescent lighting fixtures was radiated to the cooled ceiling-panel, and 24 percent to the walls and floor. For indirect lighting, these changed to 18 and 12 percent respectively.

4. More than 20 percent of the energy supplied to the lighting system can be removed by a cooled ceiling-panel. This includes the heat radiated directly to the ceiling, and that which is reradiated from the other room surfaces.

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The ASHAE Air-Borne Dust Survey

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This paper is the result of research sponsored by the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, in cooperation with the Mechanical Engineering Department, University of Minnesota, Minneapolis, Minn., and the U.S. Public Health Service.

SUMMARY—This paper describes the results of the first part of the ASHAE dust survey, which had as its principal objective the determination of air-borne dust properties that have an effect on the performance of air cleaners. Properties determined were: concentration of fibrous and fine particles, stain concentration, particle size distribution, particle density, porosity of packed sediment and dust fall.

WITHIN the last decade numerous air-borne dust surveys have been made in connection with industrial health and air pollution studies. A study of these surveys shows that they have yielded only limited data on the physical properties of air-borne dusts that have a bearing on their removal by air cleaners.

Thus, when the cooperative research project on rating and testing methods for air cleaners for occupied spaces was begun, a search of the existing literature revealed that inadequate data existed on which to base the selection of suitable test dusts for simulated air cleaner testing. A limited dust survey, therefore, was organized, having the following objectives:

1. Determination of the concentration of air-borne dust in typical indoor and outdoor locations by weight and dust spot. An independent measure of the fibrous air-borne particles such as lint was also included, because these largely determine the dust holding capacity of many types of filters.
2. Determination of the volume-size distribution of air-borne dust. The volume distribution was desired rather than the number distribution obtained by microscope count, because filter life is determined by the volume concentration.
3. Determination of other physical characteristics which it was thought might have a bearing on air cleaner performance. Some of these are: density, particle shape, porosity of a packed bed of dust and staining power.
4. Measurement of dust fall at the sampling site. This was desired because the dust fall on indoor surfaces is sometimes the principal nuisance experienced by the housewife.

A study of these objectives within the framework of available funds, facilities and personnel led to development of several new dust sampling and evaluation techniques and the modification of several old ones. The first part of this paper describes the apparatus, procedures and their evaluations and the second part gives the results from the survey. The original survey as reported in this paper is being extended to include a study of the loading characteristics of representative types of filters in typical service.

Sampling Equipment

Pumps: To permit sampling in occupied spaces the small, quiet and inexpensive diaphragm pump used in the *AISI* smoke samplers were used. These pumps were mounted in small wooden boxes lined with glass fiber sound insulating material. Leakage around the actuator gland required monthly calibration against a wet test meter to obtain a ± 5 percent accuracy of the estimated air volume sampled.

Filter Holders: The large number of filter holders required led to the development of the inexpensive plastic holders shown in Fig. 1. Designed for the standard unmounted 47 mm size millipore filters, these holders are made from commercially available 47 mm size plastic petri dishes.

Part A consists of the bottom of a petri dish with a $\frac{1}{2}$-in. copper tube hose connection cemented in place and a 40-mesh supporting screen cemented to a 47 mm plastic ring (also available commercially). The ring and screen are cemented in place in the bottom of the dish. B is the millipore filter; C is a gasket ring cut from laminated sponge rubber and leather shoe innersole; D consists of a petri dish top and bottom cemented together with a large hole cut through; F is a dish top with a piece of 170-mesh stainless steel lint screen cemented in place over a $\frac{1}{2}$-in. hole, and E shows paper clips used to hold the assembly together.

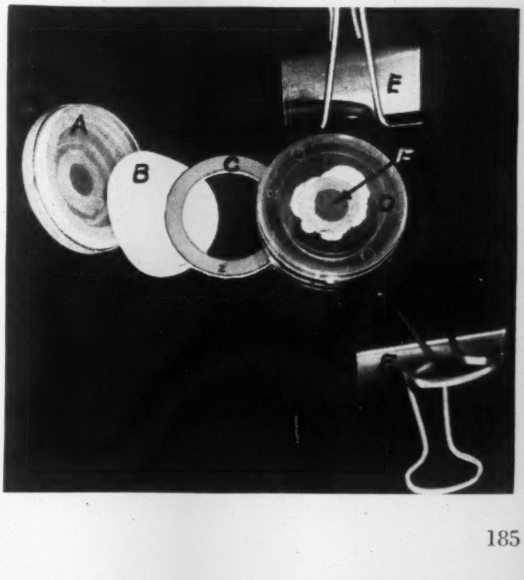

Fig. 1 — Exploded view of plastic millipore filter holder

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Journal Section

A sampling pump and holders assembled for simultaneous indoor and outdoor sampling is shown in Fig. 2.

Dust Fall Slides: *Standard* 25 × 75 mm microscope slides resting on small wood blocks were used for dust fall sampling. Before use these slides were cleaned carefully with detergent and water.

Sampling Procedures

Sampling Locations: Sampling locations were determined by a number of factors. Participation was limited to the University of Minnesota and 4 members of the Research Technical Advisory Committee on Air Cleaning of the American Society of Heating and Air-Conditioning Engineers. Locations in any given city were limited to those readily accessible to the sponsor. Though the sampling pumps were reasonably quiet, locations had to be found where the owners or occupants were willing to tolerate the occasional nuisance of a noisy pump and the weekly visits to change sampling media. Thus the number and location of samples taken represents the best compromise that could be made under the circumstances. Specific locations are discussed with the results.

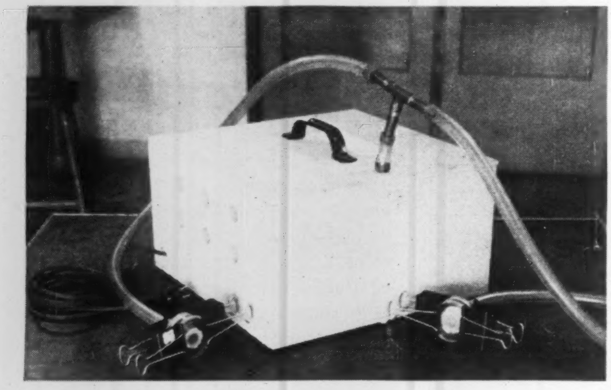

Fig. 2 — Sampling pump and filter holders assembled for simultaneous indoor and outdoor sampling

Typical Sampling Procedure: The light transmission of the clean millipore filters were read before use. The assembled samplers were then placed in operation with the dust fall slide located nearby. Sampling periods varied from 2 days to a week depending on location, dust concentration and the number of filter holders attached to a pump. The lint screen was omitted by those participants not having a photometer suitable for the evaluation of the lint screen.

Sample Evaluation

Dust Spot: Optical density of the loaded millipore filters was determined with the improved photometer described previously[1] at a 0.75-in. diaphragm opening. These measured optical densities were then used to calculate the staining dust concentration in cohs and for comparison with the optical densities calculated from the sedimentation analysis.

Lint Screen: The pronounced effects of fibrous particles on ventilation filter life made it desirable to incorporate a measure of the concentration of such particles in the survey.

After considerable study the photometric evaluation of the particles caught on a 1.27 sq cm 170-mesh stainless steel screen placed ahead of the millipore filter was adopted. The small amount of fibrous material normally collected precluded evaluation by weight. Lint screen samples were therefore evaluated with the improved photometer[1]. The optical density was calculated from measurements of the light transmission through the screen with the dust deposit and after thorough washing.

Measurements of both optical density and weight on a special 8 cm diam, 170-mesh screen by Engebretson[2], on 11 lint samples from typical residential and non-residential locations gave the following relationship between weight and screen light transmission:

$$\text{mg/cm}^2 = 2.52 \log (I_o/I) \quad \ldots\ldots\ldots (1)$$

The linear correlation was 0.989 which is surprisingly good. Lint concentrations given in the latter part of this paper are calculated using Equation 1. Not all particles collected by the screen are fibrous. Detailed study of mechanism of collection of the screen by Engebretson[2] has shown that inertial impaction of non-fibrous particles above approximately 5 μ in size can account for a substantial fraction of the total collected. Observations on particles collected on the screens during the survey indicate from 50 to 90 percent of the total can be considered as fibrous. It is, therefore, believed that this simple lint screen sampling method provides a rough but useful index of the proportion of fibrous particles normally found in air-borne dust.

Nomenclature

I_o = light transmission of a clean filter medium.

I = light transmission of a dirty filter medium.

OD = $\log_{10} (I_o/I)$.

$O.D.D.$ = $[112 (I_o - I)]/t$ (thousandths of an OD of dust fall per day).

t = time in hours.

θ = porosity.

D_p = particle diameter, microns.

D_{g1} = number geometric mean size, microns.

D_{g3} = volume geometric mean size, microns.

S = variance.

C = concentration, grains per 1000 cu ft.

K = light scattering coefficient = $\dfrac{\text{effective scattering area}}{\text{true particle projected area.}}$

μ = micron.

Dust Fall: Dust fall measurement by the use of jars placed out of doors has been standard for many years. Microscope evaluation of dust fall on microscope slides has been used by the telephone company. More recently Hemeon[3] has used photomultiplier measurement of light scattered by dust deposits on microscope slides. Though very sensitive this latter technique suffers because of the difficulty of calibration.

For the ASHAE survey a simple rapid method of moderate accuracy was obtained by increasing the sensitivity of the transmission photometer used for dust spot measurements to the point where the deposits could be evaluated by reduction in the light transmission through the slide. Sensitivity was sufficient to measure the dust fall accumulated in one day in a clean location with an accuracy of about ± 20 percent.

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[1] Exponent numerals refer to References.

Since the photometer measures optical density it has been found convenient to define a unit rate of dust fall in terms of optical density. This unit rate has been designated, for convenience, as *O.D.D.* and is defined as that quantity of dust fall per day which has an optical density of 0.001, thus

$$1\ O.D.D. = 10^{-3} \log (I_o/I) \quad .....(2)$$

An evaluation of this dust fall measurement technique by Engebretson[2] showed that the *O.D.D.* — weight per unit area relationship depends somewhat on the angle of acceptance of the measuring photocell. At a semi-angle of acceptance of 16 deg, evaluation of samples from 6 representative locations gave the following relationship. (Variance was 7 percent).

$$\log_{10}(I_o/I) = OD^* = 1.88 \text{ mg/cm}^2 \quad (3)$$

$$1\ O.D.D. = 1.66 \text{ tons per square mile per month} \quad ....(4)$$

Particle Size Analysis: Because of the extremely broad size range and variable character of air-borne dusts that exists, no single size analysis method which can be used to obtain satisfactory accuracy over the entire range from about 0.02 to 50 μ. For this study it was desired to measure or calculate the volume and area size distributions. The volume distribution was used because the volume of air-borne dust determines filter life and the area distribution because this is related to the soiling power of the dust[4].

Choice of the centrifuge sedimentation analysis method[5] as the primary method was determined by a number of considerations. Among these were availability of the equipment, speed, convenience and reasonable accuracy over the 0.3 to 25 μ size range of primary interest. A limited number of analyses were made with the light and electron microscope to supplement and check the sedimentation data. Also a few comparisons of sedimentation data with results obtained by other investigators with the jet impactor, particle counter and parallel plate air settling chamber were obtained.

Light Microscope Size Analysis: The light microscope size analysis procedure used has been described previously[4]. Dust samples are collected on hydrosol-type millipore filters and are counted and measured using a Porton-type reticule at high magnification. The equivalent of 10,000 to 15,000 was counted by a multistage procedure.

Electron Microscope Size Analysis: Through the courtesy of J. Sayer and M. Jacoby, a procedure for taking good electron microphotographs of millipore filter collected samples of airborne dust was developed and several samples thoroughly analyzed. The procedure is briefly as follows:

A 500 to 10,000 A° carbon film is evaporated onto the surface of the millipore filter. The millipore filter is then dissolved away and the carbon film containing the embedded particles is deposited on a grid. Typical photographs of dust sampled in the laboratory are shown in Fig. 4.

Multistage counts on from 3 to 5 photographs enlarged 12,000 to 30,000 times are then made by comparison with black circles having diameter ratios equal to the $\sqrt{2}$. To increase the probability of seeing the larger particles without resorting to an excessive number of photographs, counts on millipores having both high (0.4) and low (0.04) optical densities or on photographs at different magnification were used. The ratios of the measured optical densities can then be used to combine the counts.

Because of the limited number of size analyses made using the electron microscope, only limited conclusions as to its accuracy and usefulness can be made. The time-consuming nature of the count procedures and severe sampling problems probably make it mandatory to combine the electron microscope data with light microscope or preferably sedimentation analysis if misleading results are to be avoided. The good agreement between calculated and measured *OD's* shown in Table 3 indicates that the carbon film replication technique does account for most of the particles. However further comparisons with thermally precipitated dust samples are needed to accurately determine the loss of very fine particles (0.01 to 0.1μ).

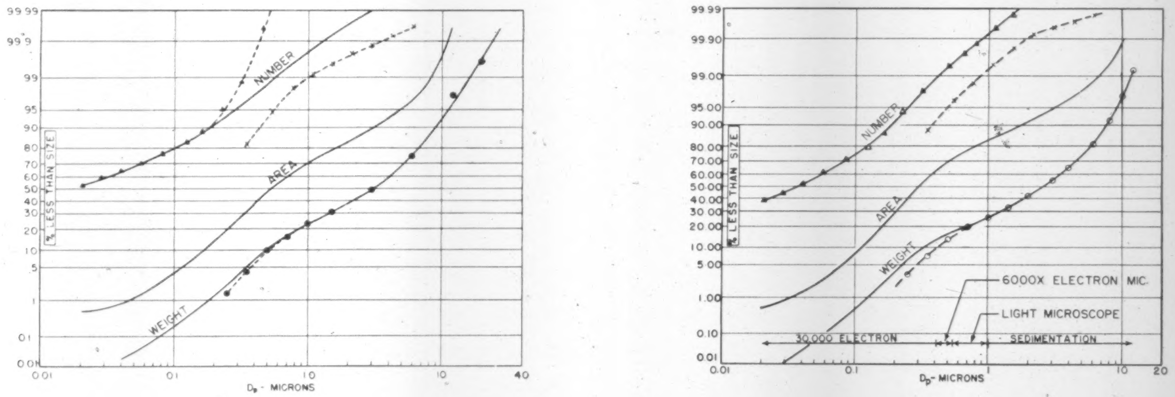

Fig. 3 — Typical air-borne size distributions from combined light and electron microscope and sedimentation data. Deltas represent measurement by electron microscope; crosses represent measurements by light microscope, and circles show measurement by sedimentation

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*Throughout the paper *OD* is used to represent optical density.

Centrifuge Sedimentation Analysis Procedure: The procedure used is essentially that described previously[2,4,5]. It is briefly as follows. A millipore filter containing between 0.3 and 1.0 mg of dust is dissolved in acetone in a 40 ml centrifuge tube using moderate stirring. The suspension is then centrifuged at 3000 rpm for 1 hr to precipitate the particles, and the supernatant liquid syphoned off. The dust is resuspended in 1 ml of feeding liquid consisting of approximately 15 percent naphtha—85 percent acetone. This suspension is then floated as a layer on a pure acetone sedimentation liquid and the size analysis carried out by the previously described techniques.

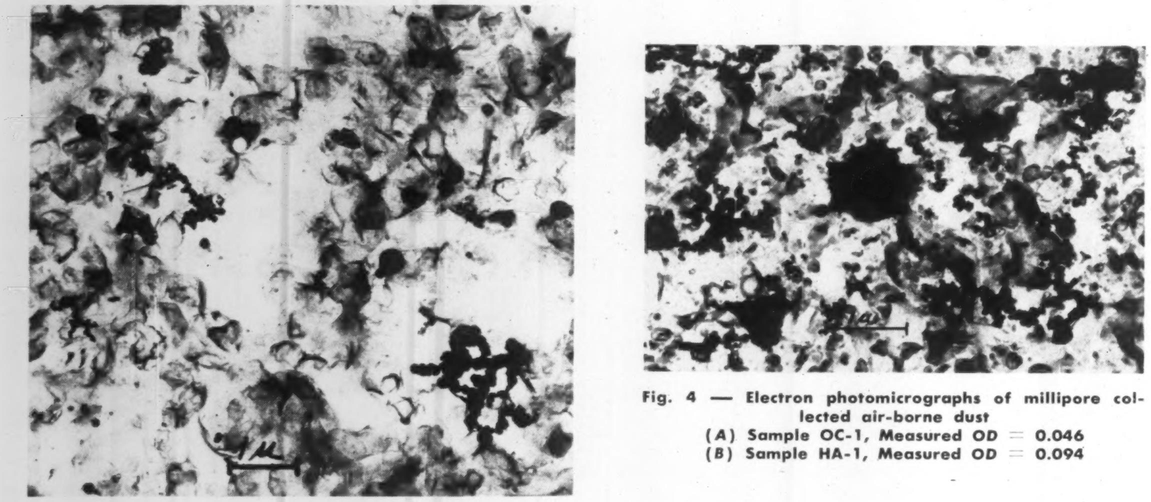

Fig. 4 — Electron photomicrographs of millipore collected air-borne dust
(*A*) Sample OC-1, Measured *OD* = 0.046
(*B*) Sample HA-1, Measured *OD* = 0.094

Evaluation of the Centrifuge Sedimentation Procedure: Because of the use of a sedimentation method for the analysis of airborne dusts may be seriously questioned, a rather thorough evaluation of its limitations and probable accuracy was made. The most important considerations and a summary of their evaluations are as follows:

1. *Dispersion.* The question arises as to whether the sedimentation particle size corresponds to that existing in the air. Throughout the survey the measured optical densities of the loaded millipore filters were compared with the optical density calculated from the sedimentation size distribution and sediment volume by the method described earlier[4]. Details of this comparison are given later. The overall ratio of measured to calculated *OD* was 1.93. It is believed that perhaps one-half of the difference between 1 and 1.93 is due to the use of an incorrect *K* value in the computations. The indications from the detailed studies of the measured optical densities of particles on a millipore at different angles of acceptance by Engebretson[2], from some relatively unsuccessful attempts at measuring the *K* value directly and from comparisons of measured and calculated *OD's* for combined size analysis such as Fig. 3, are that the *K* values are higher at larger particle sizes than is predicted by the diffraction theory curve actually used.

It is therefore believed that the observed agreement between calculated and measured *OD's* indicates that the state of the dispersion during sedimentation above 0.3 μ is essentially the same as that existing on the millipore, except possibly for very large and fragile aggregates.

2. *Millipore dust load.* It was found that proper dispersion could not be obtained if the millipore filter contained more than about 1 mg of normal air-borne dust. Irreversible agglomeration of the dust on the millipore apparently takes place if an appreciable number of particles touch each other in the dry state. From circumstantial evidence accumulated during the survey, it appears that normal air-borne dust particles are often coated with sticky materials which polymerize in the air stream after the particles are deposited on the filter. Predominently mineral dusts do not exhibit this irreversible behavior.

During the survey dust loads were normally kept below 0.5 mg per 47 mm diam millipore.

3. *Acetone soluble particles.* The sedimentation size analysis techniques employed measure only the acetone insoluble particles. The work of Chambers et al[6] indicates that the average city dust probably contains 15 to 20 percent acetone soluble particles. It is, therefore, probable that the dust concentrations computed from the sediment heights are about 15 percent low on the average. The size distributions reported are therefore only those of the acetone insoluble fraction, since all methods of size analysis used destroy the soluble particles before measurement.

4. *Sediment column bulk density.* Computations of the dust concentration depend on the sediment column bulk density which in turn is a function of the true particle density and the sediment porosity.

Acetone displacement measurement of the density of 5 samples of dust taken from electronic air cleaners operating dry in representative locations gave densities ranging from 1.74 to 2.43 gm per cc with a mean of 2.06. The lowest value was obtained on dust taken from a residential air cleaner. A density value of 2.1 gm per cc was assumed for all calculations reported in this paper.

Measurements of the porosity of the sediment column in the centrifuge tube were made on 13 samples of atmospheric dust by weighing millipore samples and then determining the sediment height. To obtain greater weighing accuracy the sediment from a number of the millipore samples was washed from the centrifuge tubes and re-weighed in tared aluminum dishes. Results are given in Table 1. A value of 0.6 was used for all computations reported in this paper.

For atmospheric dust, values of θ (where θ = porosity) ranged from 0.4 to 0.84 with the highest values being deter-

Table 1 — Sediment Column Porosities for Several Dusts

Dust	D_{gs}	No. of Samples	Assumed Density	Porosity θ	S/%
Atmospheric	3.0	13	2.1	0.67	54
Arizona Rd. Dust	2.0	8	2.7	0.55	
Precipitated Carbon Black	4.5	6	2.1	0.88	

mined on dust from residential samples or from laboratory samples containing a large proportion of carbon aggregates.

5. *Sediment column compaction.* Some compaction was experienced with samples containing more than a few percent of fibrous particles. Samples taken without a lint screen preceding the millipore filter were poured through a 325-mesh screen while suspended in the feeding liquid in order to eliminate fibrous particles. Thus the sedimentation data reported in this paper is for the minus 325-mesh fraction only.

The effect of compaction during a size analysis is to give a low estimate of the amount of particles below approximately 0.8 μ. This can be seen in Fig. 3.

6. *Reproducibility.* The variance of the size analysis on 4 simultaneous samples was determined by Engebretson[2] to be: S = 16 percent at 5th percentile, 9 percent at 50th percentile, and 17 percent at the 95th percentile.

Combined Size Analysis: As a check on the sedimentation size analysis method, 3 complete analyses of millipore dust samples collected in the laboratory were made, using combined light microscope, electron microscope and sedimentation data. Results of these 3 analyses are tabulated in Table 2 and the latter 2 plotted in Fig. 3.

These distributions were computed† using light and electron microscope data below 1 μ and sedimentation data just mentioned. Upper size limits for the light and electron microscope were taken equal to the size where the probability of seeing a larger particle is about equal to 10^{-4}. This limit was chosen because it is impractical to count more than about 10^4 particles even with multistage procedures. Lower limit for the light microscope is determined by the limit of resolution.

The lower limit for the sedimentation analysis, as used in the combined analysis, is 1 μ. Actually the useful lower limit is about equal to the size at which the cumulative percent is about equal to the sediment column reading accuracy. For normal air-borne dust this is between 0.2 and 0.4 μ.

As a further check on the accuracy of the measured size distributions, the optical densities for the individual and combined distributions were calculated and compared with the measured *OD's*. These are tabulated in Table 3.

From Fig. 3 and Tables 2 and 3, it is possible to draw a number of conclusions.

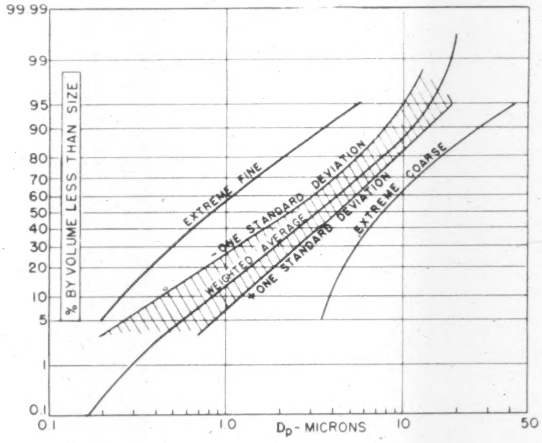

Fig. 5 — Sedimentation size distribution of air-borne dust wet-sieved through 325-mesh screening

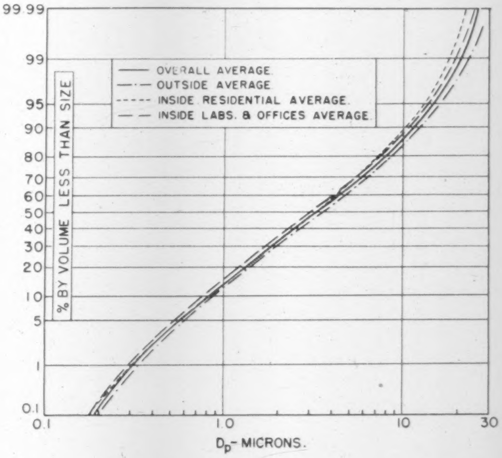

Fig. 6 — Average sedimentation size distributions wet-sieved through 325-mesh screening for three locations

Table 3 — Comparison of Measured and Calculated Optical Densities for Atmospheric Dust Samples HA-1 and HA-3

Distribution	Measured *OD*	Calculated: $K = 1$	Calculated: K for Diff Theory[a]
Sample HA-1			
Light Microscope Alone	0.094	0.0106	0.0164
Electron Microscope Alone	0.094	0.0586	0.0654
Sedimentation Alone	0.417	0.290	0.437
Combined	0.094	0.0706	0.0914
Sample HA-3			
Light Microscope Alone	0.122	0.0115	0.0187
Electron Microscope Alone	0.122	0.1008	0.0128
Sedimentation Alone	0.568	0.324	0.460
Combined	0.122	0.115	0.104

[a] The light scattering coefficient, K, used is that suggested by Davies[4] for opaque particles in a transparent media. No satisfactory data exist for opaque particles on a translucent filter media.

Table 2 — Composite Size Analyses of Atmospheric Dust
(Sampled Inside University of Minnesota Particle Laboratory)

Particle Size Microns (μ)	OC - 1 March 1956 No.	OC - 1 March 1956 Wt	HA - 1 January 1957 No.	HA - 1 January 1957 Wt	HA - 3 January 1957 No.	HA - 3 January 1957 Wt
0.02			52	0.006	38	0.008
0.04	0.7		64	0.02	52	0.03
0.1	7.5	0.02	80	0.20	75	0.5
0.4	87	5.6	97.5	7.1	98.9	13.6
1	99	15.0	99.8	23.1	99.94	26
4	99.98	60	99.995	59.5	99.998	66
10	99.9996	90	99.99999	92.5	99.99998	97.0
20		99		99.7		100.0

1. The light microscope can at best give only a poor estimate of the complete size distribution of normal air-borne dust. This is shown by the poor agreement between calculated and measured *OD's* in Table 3 and the fact that only 0.2 to 0.1 percent or less of the particles can be seen using practical techniques.

2. A single-stage electron microscope count such as was used on sample HA-1 is inadequate. However, the multi-stage E M count used on HA-3 (Fig. 3B) appears to give accurate data up to about 1 μ.

3. The sedimentation method will be most accurate above 1 μ but gives a progressively lower estimate below 1 μ. From Fig. 3 it can be seen this error is not too serious above about 0.4 μ.

4. Probably the most accurate method would be a combination of sedimentation and electron microscope.

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†Due to the involved nature of this work, it is planned to write a separate paper describing the methods of analysis, theory and computational procedures.

5. From Fig. 3B, it can be noted that the 99.9 percent by number of particles below 1 μ acounts for over 90 percent of the projected area or staining power, but only about 25 percent of the total volume. This illustrates clearly that the rating of air cleaners by number, dust spot or weight arrestance have quite different meanings.

Dust Survey Results

Sampling Frequency and Location: Dust survey samples were taken by 6 contributing groups in 4 individual cities; *viz*: 3 in Pittsburgh, one in Louisville, one in Akron, and the University of Minnesota in Minneapolis. The majority of sampling was done in Minneapolis and Louisville, but enough samples were received from the other cities to indicate the amount of variation to be expected between extreme conditions.

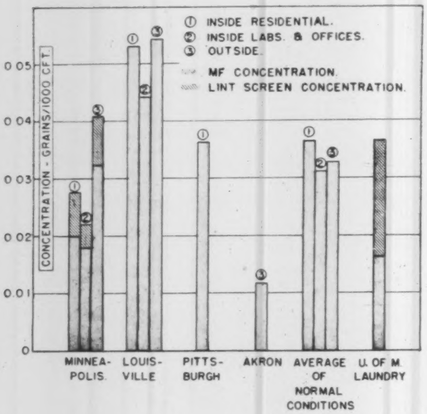

Fig. 7 — Dust concentrations for several locations

The groups took samples in the following locations: inside and outside residences, inside and outside labs and offices, inside industrial plants. The inside locations represented a range of conditions from old downtown-area buildings employing no air cleaning to newly-remodeled, windowless offices with modern air cleaning equipment. Outside sampling was done in areas ranging from commercial districts to clean residential areas.

Unfortunately, it was impossible to maintain continuous or nearly-continuous sampling at any given location throughout a complete year's cycle. Only at the University of Minnesota were enough samples obtained to test for seasonal variations.

Averaging Procedure: All *overall* average values are the result of weighting equally the 3 major location categories: (1) inside residences, (2) inside labs and offices, and (3) outside. This gives twice as much weight to inside locations as to outside, which might be justified on the grounds that a high percentage of the air passing through most ventilation air cleaning systems is recirculated air, but the average values at each location are so similar that any reasonable system of weighting would produce essentially the same results.

The average values *inside residences* were obtained by weighting equally the averages for 3 cities — Louisville, Minneapolis, and Pittsburgh. ***Inside labs and offices*** averages were computed by giving equal weight to the average values for Minneapolis and Louisville. The *outside* average values gave equal weight to averages from 3 cities — Akron, Louisville and Minneapolis — on all items except those pertaining to size distribution. For the 5, 50, and 95 percentile sizes, averages from Pittsburgh were included at equal weight.

Table 4 — Average Dust Properties

Median Size Inside Residences	No. Samples	D_{g3}-μ	S-%
All residential	26	3.17	24
All Minneapolis residential	17	3.31	23
South Minneapolis	13	3.41	17
Southeast Mpls. Apt.	4	3.00	38
Louisville residential	6	2.64	27
Pittsburgh residential	3	3.57	9
Median Size Inside Labs and Offices	**No. Samples**	**D_{g3}-μ**	**S-%**
All samples	67	3.01	29
Minneapolis Labs & Offices	64	2.69	37
Minneapolis Labs	41	2.35	35
Minneapolis Offices	24	3.30	31
Louisville Labs & Offices	3	3.32	16
Median Size — Outside Air	**No. Samples**	**D_{g3}-μ**	**S-%**
All samples	40	3.56	33
Minneapolis (all)	23	4.31	28
Minneapolis Lab	13	4.09	30
Minneapolis, south residences	8	4.95	20
Louisville (all)	9	2.65	21
Louisville Lab & Office	3	3.10	21
Louisville Residential	6	2.43	13
Akron (Residences & Lab)	5	2.82	10
Pittsburgh	3	4.47	22

Average Dust Properties: The *geometric mean size* by volume (D_{g3}) of natural air-borne dust was found to vary with location, and displayed a range of values at any given location. The mean size was 3.25 μ, with a 30 percent variance (S). Inside residences, D_{g3} was 3.17 μ ($S = 24$ percent).

A breakdown of these data is contained in Table 4. The south Minneapolis samples were obtained in 2 separate, but closely-located homes in the extreme southern part of the city. The Louisville sampling was done in 3 homes. The overall average of $D_{g3} = 3.17 \pm 24$ percent covers a range which includes all of the individual averages shown.

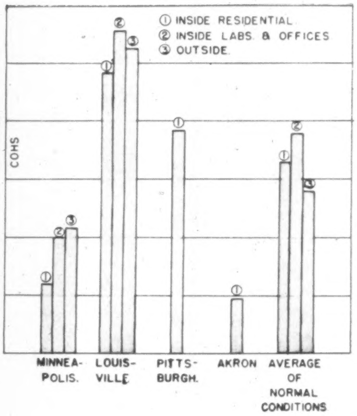

Fig. 8 — Staining concentration

Inside labs and offices, $D_{g3} = 3.01$ μ ($S = 29$ percent). Table 2 contains the more detailed data from which this average was obtained. Offices and laboratories were combined as one category because of the similarity of their construction and atmospheres. Both are relatively lint-free and clean, and do not have direct outside entrances.

Outside air had a geometric mean size, by volume of $D_{g3} = 3.56$ μ ($S = 33$ percent). Table 4 shows the detailed data. Louisville mean size of 2.65 μ, it will be noted, was considerably less than Minneapolis average mean of 4.31 μ, and even further from the south Minneapolis residential mean of 4.95 μ.

As noted from the variance, the geometric mean size has considerable spread. The values for inside residences ranged from 1.34 to 4.60 μ and for inside labs and offices from 0.83 to 5.15 μ. For outside air the range was 2.69 to 7.60 μ.

At a confidence level of 95 percent or higher, the average inside residential and inside labs and offices means are equal, but each of these varies significantly from the outside average.

In general, *the cumulative size distribution curve* is bimodal. An overall average curve, weighting equally the 3 major classes of location, is shown in Fig. 5 with 5 percent, by weight, smaller than 0.56 μ, 50 percent smaller than 3.25 μ, and 95 percent smaller than 14.3 μ. Fig. 5 includes, additionally, the curves corresponding to plus and minus one standard deviation, and the extreme distributions found. The distributions for each of the 3 major locations, shown in Fig. 6, are very similar to the overall average distribution and warrant no further explanation. The size distributions for individual samples were strongly bimodal, but this characteristic was diminished by successive average processes.

Because all of the groups were not equipped to measure *the lint concentrations*, an overall average is not possible. Considerable information is available, however, from the Minneapolis data. Inside Minneapolis residences, the lint screen loading constituted an average of 27.6 percent of the total dust weight. Breaking this average down further, 13 south Minneapolis samples showed an average 27.8 percent, and 4 southeast Minneapolis samples had an average of 27.4 percent. Dust samples taken inside Minneapolis labs and offices had an average lint screen loading of 17.2 percent, by weight. Considering the 24 office samples alone, offices had 16.6 percent. The 41 lab samples had an average of 18.0 percent. Air outside the Minneapolis lab contained 21.5 percent and air outside south Minneapolis residences contained 16.4 percent.

Average Concentrations: The airborne dust retained on the millipore filter had an overall average concentration of C = 0.0335 grains per thousand cu ft (S = 77 percent). No overall lint-screen concentration is possible for reasons explained previously. Fig. 7 illustrates the differences in concentrations for the 3 classes of location between cities, plus information on an unusual location.

SHAPE	APPEAR-ANCE	KINDS	% IN DUST BY WT.	
			RANGE	AVE.
SPHERICAL		SMOKES POLLEN FLY ASH	0-20	10
IRREGULAR CUBICAL		MINERAL CINDER	10-90	40
FLAKES		MINERALS EPIDERMIS	0-10	5
FIBROUS		LINT PLANT FIBER	3-35	10
CONDENSA-TION FLOCCS		CARBON SMOKES FUMES	0-40	15

Fig. 9 — Air-borne dust particle shapes

The average MF (millipore filter) concentration *inside residences* was C=0.0365 gr per tcf* (S=85 percent). Minneapolis residences had an average MF concentration of 0.0200 gr per tcf (S=67 percent) and a lint concentration of 0.0076 gr per tcf (S=80 percent) for a total of 0.0276 gr per tcf (S=61 percent). The south Minneapolis residential samples, taken alone, averaged 0.0162 gr per tcf MF dust (S=25 percent), 0.0062 gr per tcf lint (S=57 percent) and 0.0244 gr per tcf total (S=34 percent). Louisville residences had an average MF concentration of 0.0531 gr per tcf (S= 86 percent) while the Pittsburgh MF concentration was 0.0364 gr per tcf (S=21 percent).

The average MF concentration *inside labs and offices* was 0.312 gr per tcf (S=70 percent). The Louisville MF samples averaged 0.0442 gr per tcf (S=53 percent) while the Minneapolis MF average was 0.0183 gr per tcf (S=52 percent). In Minneapolis an additional 0.0038 gr per tcf (S=89 percent) was measured as lint, for a total concentration of 0.0221 gr per tcf (S=56 percent).

Samples of *outside air* had an average MF concentration of 0.0328 gr per tcf (S=71 percent). Akron MF concentrations averaged 0.0118 gr per tcf (S=45 percent) while Louisville had 0.0543 gr per tcf (S=42 percent) and Minneapolis had 0.0324 gr per tcf (S=42 percent). In addition, Minneapolis had a lint concentration of 0.0085 gr per tcf (S=59 percent) for a total concentration of 0.0409 gr per tcf (S= 27 percent).

Measured Cohs: The measured coh values for the principal locations and cities are as shown in Fig. 8. The most significant fact is that the variation between cities is much more pronounced than the variation between locations within any one city. The locational variations within each city are of doubtful significance.

Ratio of Measured Cohs to Calculated Cohs: The overall average ratio of measured to calculated cohs was 1.93 (S=46 percent), corresponding to a mean size of 3.25 μ. The inside residential ratio was 1.82 (S= 48 percent), corresponding to D_{g3}= 3.17μ, while the value inside labs and offices was 2.19 (S=47 percent) for D_{g3}=3.56μ.

As a further check on the effect of size distribution on the ratio of measured to calculated cohs, the average ratio of all samples with a mean size less than 2 μ was compared to the average ratio for samples with mean diameters greater than 4 μ. The *under 2-μ* samples yielded an average D_{g3}=1.58μ and a ratio of measured to calculated cohs of 1.43. The *over 4-μ* samples had a D_{g3} of 4.83 μ and a ratio of 2.68. The difference between these ratios was significant at a 99.9 percent confidence level.

Dust Fall: Measurements of the atmospheric dust fall were made only at Minneapolis. The respective values are given in Table 5.

Table 5 — Dust Fall in Minneapolis

Location	No. of Samples	O D.D.	S - %
Inside Labs & Offices	30	0.80	66
Inside Labs	8	0.63	91
Inside Offices	22	0.86	57
Inside Residences	12	0.93	56
Oustide	13	4.92	26

The variation between labs and offices was not significant at a 95 percent confidence level, and similarly the variation between *residences* and *labs and offices* was insignificant. However, the average value for outside samples is significantly different from average of all inside samples. Therefore, it may be concluded that in Minneapolis the dust fall is essentially constant for all normal inside locations, although scattered data indicates significant variations between rooms of a particular house.

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*gr per tcf is grains per thousand cubic feet.

Seasonal Variations: A significant seasonal variation in mean dust size was evidenced in samples taken inside the Minneapolis lab, the only sampling location having sufficient year-round data for such an analysis. The year was divided into 2 periods: (1) the non-heating season from June 1 to August 31, and (2) the remainder of the year, September 1 to May 31. The average for the period June 1 to August 31 was $D_{g3} = 1.83\ \mu$ while the remainder of the year had an average of 2.58 μ. This difference in mean sizes was significant at a 95 percent confidence level.

Significant variations were also noted in millipore filter and lint screen concentrations, for the same location. The MF concentration for the period, June 1 to August 31, averaged 0.0130 gr per tcf ($S=25$ percent), while for the remainder of the year it averaged 0.0175 gr per tcf ($S=34$ percent). This difference was significant at a 95 percent confidence level. The corresponding lint screen concentrations were 0.0022 gr per tcf ($S=65$ percent) and 0.0042 gr per tcf ($S=42$ percent), respectively. This difference was significant at better than a 99 percent level.

The bimodal character of the size distribution, referred to previously, was appreciably diminished or nonexistent within experimental accuracy in the majority of summer samples. The summer atmospheric dust, it has been noted has finer distribution, a lower concentration, and a measured to calculated coh ratio closer to unity than the dust existing during the remainder of the year. This may be explained by considering the normal atmospheric dust to consist of 2 general types of material, besides the lint; a mineral fraction of relatively fine size distribution, and a carbonaceous fraction of relatively coarse distribution. These 2 overlapping distributions would give the bimodal characteristic in the fall, winter, and spring, with the carbonaceous fraction gradually diminishing until an almost unimodal distribution is obtained during the summer. The mineral fraction concentration is believed to remain fairly constant year-round. The lower measured to calculated coh ratio substantiates this theory, because supplementary work has indicated that the principal error in the K values assumed for the purpose of this work, is at the coarse end of the range. Additional evidence is the fact that the summer samples are brown rather than black.

Conclusions

Following are the important conclusions from this survey and from the analysis of work by other investigators. Because of the limited number of samples and sampling locations in the present survey, the numerical values in Table 6 represent a combination of straightforward statistical weighting and judgment based on less tangible factors. It should be emphasized that, to a certain extent, results are dependent on the analysis methods used.

Variation in Properties and Concentration

1. The differences in particle character and concentration between clean non-industrial cities such as Minneapolis and polluted industrial cities are much greater than the differences in size distribution.

Table 6 — Properties of Average Air-borne Dust

Property	Range	Average
Weight[a] geometric mean size = D_{g3}	0.8 — 8	3 μ
Number geometric size = D_{g1}	— to 0.2	0.03 μ
Particle density	1.5 — 3.0	2.1 gm/cc
Porosity =	0.85 — 0.5	0.65
Bulk density	0.2 — 1.5	0.7 gm/cc
Fraction fibrous particles[b]	3 — 35	10%
Upper particle size[a]	15 — 50	25 μ
Terminal velocity of laggest particles	2 — 10	3 cm/sec
Dust fall	0.4 — 10	1.5 *O.D.D.*
Size distributions	(Figs. 3 & 5)	
Concentration	(Figs. 7 & 9)	
Physical shape of particles	(Fig. 9)	

[a] This is the Stoke's equivalent spherical size calculated from settling velocity. Large irregular particles of low density such as lint may be larger physically in one or more dimensions.

[b] The values given here represent the actual fraction of particles that can be considered fibrous. This will be from 50 to 90 percent of the weight of dust that can be caught on the 170-mesh screens used on the millipore samplers.

2. The variations in normal airborne dust are large enough to make it suitable as a test dust only for rough performance testing of air cleaners.

3. For Minneapolis, summer dust is significantly finer, lighter colored, of lower concentration and less bimodal in size distribution than dust during the rest of the year. This may be attributed to a reduction in the carbonaceous and fly ash particles during the summer.

4. The large differences in the amount of fibrous particles found in different locations may have very significant effects on the operation of air cleaners. This conclusion is substantiated by current research on filter life.

Miscellaneous Conclusions

1. In normal air-borne dust most staining is done by particles less than 5 μ in size.

2. Most air-borne dust aggregates are tightly bonded together and require severe mechanical dispersion to break them up.

3. Natural air-borne dust particles collected in bulk suffer irreversible agglomeration due to polymerization of compounds in the dust.

4. The millipore filter sampling and sedimentation weight concentration and size analysis technique is convenient, rapid and flexible. It appears to be well suited to general purpose air-borne dust evaluation.

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6. The Characteristics and Distribution of Organic Substances in the Air of Some American Cities, by L. A. Chambers, E. C. Tabor and M. J. Foter (*R. A. Taft Sanitary Engineering Center, U. S. Public Health Service*, Cincinnati, Ohio, May 1955).

Society Nominations for 1958

The Nominating Committee, which was selected as provided in Article VIII — *Section 3* of the Society's By-Laws, has submitted its nominees for Officers and members of the Council for 1958, and the Council, in accordance with Article VIII — *Section 4*, has announced its nominees for election to the Committee on Research. Proxy ballots containing the names of the candidates will be sent to the membership prior to the Annual Meeting in January.

Report of Nominating Committee

President
E. R. Queer, University Park, Pa.

First Vice President
A. J. Hess, Los Angeles, Calif.

Second Vice President
Walter A. Grant, Syracuse, N. Y.

Treasurer
John H. Fox, Toronto, Ont., Canada

Members of Council *(Three-Year Term)*
*F. H. Faust, Bloomfield, N. J. (Region 1)
Fred Janssen, Denver, Colo. (Region 3)
*J. W. May, Louisville, Ky. (Region 5)
G. B. Priester, Baltimore, Md. (Region 5)

Respectfully submitted,
NOMINATING COMMITTEE
B. L. Evans, *Chairman*
J. S. Locke, *Secretary*

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*Regional Director.

Nominees for Committee on Research

The election of the Committee on Research is governed by the By-Laws for the election of Officers, with the exception that members of the Committee on Research are nominated by the Council.

In accordance with the provision of **Article VII** — *Section* 3 *(h)* the Council announces the nomination of the following members of the Committee for election to succeed those members whose present terms expire January 1958.

Committee on Research *(Three-Year Term)*
P. R. Achenbach, Washington, D.C.
S. F. Gilman, Syracuse, N. Y.
N. B. Hutcheon, Ottawa, Ont., Canada
R. M. Stern, Seattle, Wash.
H. E. Ziel, Detroit, Mich.

By-Law Provisions on Nominations and Voting

Article VII—*Section 3*, **General Committees.** ....
(b) Committee on Research, consisting of fifteen (15) MEMBERS, nominated by the Council or as provided in **Article VIII**, *Section 4*, and elected by the Society in the manner of elected officers ....

Article VIII—*Section 3*. **Nominating Committee.** The Nominating Committee, to serve for a term of one (1) year from the opening of the Annual Meeting shall consist of eleven (11) MEMBERS and sixteen (16) alternate MEMBERS, all of whom shall have been in good standing as MEMBERS for a period of at least five (5) years. Four (4) members and one (1) first alternate and one (1) second alternate member of the said committee, each from a different Regional Area, shall be selected by the Council at or prior to its last quarter-annual meeting; and one (1) member and one (1) first and one (1) second alternate member shall be selected by each Chapters Regional Committee, and certified to the Executive Secretary by September 1 of each year. No member of the Council shall be eligible to serve on the Nominating Committee, and no Chapter shall be represented on the said committee by more than one (1) of the eleven (11) MEMBERS. The Nominating Committee so chosen shall effect its own organization during the Annual Meeting of the Society, and shall hold a meeting during the Semi-Annual Meeting of the Society. By September 1 of each year the Nominating Committee shall nominate candidates for the elective offices, the members of the Council and the Regional Directors to be elected at the ensuing Annual Meeting, and notify the Executive Secretary of the names of the nominees, the notice to be accompanied by the written acceptances of the candidates. Seven (7) members entitled to vote on the said committee shall constitute a quorum. No alternate member may be present at committee meetings, nor shall he participate in the deliberations thereof or vote therein except in the absence of the member, or the member and the first alternate member of the one of the eight (8) groups with which he was selected. The transportation expenses, as defined by the Council, of eleven (11) committee members who participate in the deliberations at the annual and semi-annual meetings of said committee shall be included in the budget and defrayed by the Society.

Section 4. **Other Nominations.** Nominations of officers and members of the Council, other than those nominated by the Nominating Committee, and nominations of members of the Committee on Research, other than those nominated by the Council, may be made in writing by at least fifty (50) members eligible to vote, upon presentation of such nominations, with each nominee's consent, to the Executive Secretary at least sixty (60) days prior to the opening of the first session of the Annual Meeting, whereupon the nominees' names shall be placed upon the ballot with a notation that they are presented by members independent of the Nominating Committee.

Section 5. **Voting.** Voting at any meeting may be in person or by proxy, but only the Executive Secretary and MEMBERS of the Society shall be eligible to act as proxies. Proxies shall not be valid for more than three (3) months from dates of execution. The Executive Secretary and the MEMBERS acting as proxies shall hold the ballots of their principals secret and confidential. Voting for election of officers, Council members, members of the Committee on Research, on proposals to amend these By-Laws, and on questions required to be referred to the Society persuant to **Article V**, *Section 2*, shall be by secret ballot. In the event of any tie vote, the Council shall decide the vote.

Section 6. **Ballots.** Together with notice of the Annual Meeting, the Executive Secretary shall forward appropriate proxies and ballots to members entitled to vote. The proxies and ballots shall contain spaces for write-in names.

Visit Pittsburgh In January!

ASHAE Annual Meeting

The 64th Annual Meeting of the Society is about 8 weeks away. It is not too early to make hotel reservations and advise the Pittsburgh Chapter Committee on Arrangements what special events tickets should be reserved. Although the response is good, members are urged not to delay in returning reservation forms received last month.

The Penn-Sheraton, Pittsburgh, Pa., from January 27-29, 1958 will vibrate with the activity of many ASHAE members hustling to and from sessions, committee meetings and informal get-togethers.

Through the combined efforts of the Program and Papers Committee, with John Everetts, Jr., Philadelphia, Pa., as chairman, and the Pittsburgh Chapter Committee on Arrangements, T. F. Rockwell, general chairman, the days and nights from Sunday through Wednesday will provide varied activities of interest to every member and his wife.

Following various committee meetings on Saturday and Sunday, January 25-26, Pres. P. B. Gordon, New York, will open the 64th Annual Meeting at 9:00 a.m. Monday morning. After reports are presented this first session will be a Topical Session on Solar Energy.

This is the only session scheduled for Monday and it precedes the Welcome Luncheon at 12:30 p.m. Inspection trips to the H. J. Heinz Co., Buhl Planetarium and conducted tour of Pittsburgh are scheduled for 2:00 p.m. Monday. Later in the afternoon at 2:30 p.m. in the Penn-Sheraton a Tea and Entertainment for the ladies will feature popular Pittsburgh comedienne Nan Neugebauer and a program of humor and satire at the piano.

Monday evening at 9:30 a real treat is offered by the Pittsburgh Chapter as they are turning back the clock to the Gay Nineties for your added pleasure and enjoyment.

Tuesday morning there will be two sessions both starting at 9:30 a.m. with 1st Vice Pres. E. R. Queer presiding at one and 2nd Vice Pres. A. J. Hess at the other. One of the sessions is a Symposium on High Temperature Water moderated by P. N. Vinther, member of Council from Dallas, Tex. Five prominent men will participate covering different and specific subjects on the general topic of High Temperature Water.

While the men are in attendance at the Tuesday morning sessions the ladies may enjoy a pleasant bus tour and luncheon, departing from the Penn-Sheraton at 10:00 a.m. The tour consists of the Ft. Pitt Block House, Buhl Planetarium and an incline plane ascent to Pittsburgh's Mt. Washington. The tour concludes at the University of Pittsburgh Civic Center and luncheon in the University Club.

The men have a choice of 3 interesting inspection trips on Tuesday; the Homestead Steel Works, the largest U. S. Steel Corp. plant in eastern United States; Gulf Oil Corp. Research Laboratories or the Pittsburgh Consolidated Coal Co. All tours begin at 1:00 p.m. In addition, the Monday tours to Buhl Planetarium and Pittsburgh points of interest will be repeated at 1:30 p.m.

The final day Wednesday, will consist of 2 morning and 2 afternoon sessions, a conducted tour at 2:30 p.m. of the 30-story Alcoa Building, and the Annual Banquet.

Pa Pitt and the Pittsburgh Chapter look forward to welcoming you; don't disappoint them!

TENTATIVE PROGRAM — 64TH ANNUAL MEETING

Penn-Sheraton Hotel, Pittsburgh, Pa.

January 27-29, 1958

Saturday — January 25

10:00 a.m. Committee Meetings

Sunday — January 26

10:00 a.m. Council Meeting
1:30 p.m. Registration

Monday — January 27

9:00 a.m. Registration

9:00 a.m. First Session

Call to Order — Pres. P. B. Gordon
Report of President — P. B. Gordon
Report of Council — A. V. Hutchinson
Report of Treasurer — C. H. Pesterfield
Topical Session on Solar Energy
R. C. Jordan, *Chairman*
Direct Solar Radiation Available on Clear Days, by J. L. Threlkeld and R. C. Jordan
A High-Flux Low-Temperature Solar Collector, by R. G. Nevins and P. E. McNall, Jr.
Performance of a Solar Heated Office Building, by F. H. Bridgers, D. D. Paxton and R. W. Haines
Sun Energy Assistance for Air-Type Heat Pumps, by C. P. Davis, Jr. and R. I. Lipper
12:30 p.m. Welcome Luncheon
Presentation of Certificates to Fellows
Presentation of ASHAE — Homer Addams Award
2:00 p.m. Inspection Trips
2:30 p.m. Ladies' Tea and Entertainment
9:30 p.m. Gay Nineties Party

Tuesday — January 28

9:00 a.m. Registration
9:30 a.m. Second Session
Call to Order — 1st Vice Pres. E. R. Queer
Report of Committee on Research — H. A. Lockhart, *Chairman*
Report of Inspectors of Election
Cooling Load from Thermal Network Solutions, by Harry Buchberg
The ASHAE Air-Borne Dust Survey, by K. T. Whitby, A. B. Algren, R. C. Jordan and J. C. Annis
Natural Convection Cooling and Dehumidifying, by L. G. Seigel and W. L. Bryan
Stable Hot-Wire Anemometer for Low Speeds, by J. F. Kemp (by title only)

9:30 a.m. Third Session
Call to Order — 2nd Vice Pres. A. J. Hess
Symposium on High Temperature Water
P. N. Vinther, *Moderator*
Economic Evaluation of High Temperature Water, by E. M. Thompson
Marine Application of High Temperature Water, by S. W. Brown
Design of High Temperature Water Systems for Military Installations, by C. A. Carter and B. L. Sturdevant
Heating and Air Conditioning a Civilian Airport, by Charles Broder
British and European Design and Construction Methods, by George Applegate, Jr.
Report of Inspectors of Election

10:00 a.m. Ladies' Bus Tour and Luncheon
12:15 p.m. Dutch Treat Luncheon — Life Members Club
1:00 p.m. Inspection Tours
1:30 p.m. Nominating Committee Meeting
7:00 p.m. Past Presidents' Dinner
8:00 p.m. Chapter Editors' Conference, B. W. Farnes, *Chairman*

Wednesday — January 29

9:00 a.m. Registration

9:30 a.m. Fourth Session

Call to Order — Pres. P. B. Gordon
Effect of Heated Floor Temperatures on Comfort, by R. G. Nevins and A. O. Flinner
Lighting and Cooled Air Effects on Panel Cooling, by L. F. Schutrum and T. C. Min
Radiant Drafts from Cold Ceilings, by H. E. Ronge and B. E. Lofstedt

9:30 a.m. Fifth Session
Call to Order — Treas. C. H. Pesterfield
Local Climatic Weather Data, by W. L. Holladay
A Dynamic Heat Storage System, by T. L. Etherington
Improving Attic Space Insulating Values, by F. A. Joy

2:00 p.m. Sixth Session
Call to Order — 1st Vice Pres. E. R. Queer
Chimney and Stack Design for Gas-Fired Equipment, by R. L. Stone
Pressure Losses and Flow Characteristics of Multiple-Leaf Dampers, by E. J. Brown and J. R. Fellows
Fan Noise Variation with Changing Fan Operation, by R. D. Madison and J. B. Graham

2:00 p.m. Seventh Session
Call to Order — Pres. P. B. Gordon
Symposium on School Heating, Ventilating and Air Conditioning
W. G. Hole, *Moderator*
Educator's View of Need for Good Classroom Environment, by G. B. Wadzeck
HV&AC Design Practice for Schools, by Henry Wright
Economics of School Heating and Air Conditioning, by Z. A. Marsh
State Board Problems — Financing and Others, by C. B. Hershey
Looking Into the Future, by E. G. Good
Report of Resolutions Committee
Unfinished Business
New Business
Adjournment

7:00 p.m. Annual Banquet
Toastmaster: Thomas Pratt; Member of Ingham, Boyd & Pratt, Architects
Speaker: Allison R. Maxwell, Jr. President, Pittsburgh Steel Co.
Introduction and Installation of 1958 Officers
Presentation of F. Paul Anderson Medal
Presentation of Past President's Award to P. B. Gordon

Thursday — January 30

9:00 a.m. Organization Meeting of 1958 Council

R. B. Stanger

T. F. Rockwell

D. W. Loucks

E. H. Riesmeyer, Jr.

PITTSBURGH CHAPTER

COMMITTEE ON ARRANGEMENTS

64th Annual Meeting

January 27-29, 1958 — Pittsburgh, Pa.

(l. to r.) Top: D. B. Hicks, J. H. Llewellyn; **Center:** Edward Claitman, R. M. Toucey; **Bottom:** C. W. Stanger, L. B. Wilkes.

(l. to r.) Top: E. J. Busch, A. J. Meade; **Center:** B. R. Small, H. Lee Moore; **Bottom:** B. B. Reilly, A. F. Metzger.

T. F. Rockwell, *General Chairman*

D. W. Loucks, *Vice Chairman*

R. B. Stanger, *Honorary Chairman*

FINANCE

H. L. Moore, *Chairman;* P. A. Edwards, W. D. Simpson, E. C. Smyers, K. W. Stickle.

HOSPITALITY

E. J. Busch, *Chairman;* W. A. Allen, J. C. Benson, W. Y. Humphreys, III, W. E. Keist, E. J. Kelly, J. H. Llewellyn, A. J. Meade, W. B. McCreery, Jr., R. M. Meucci, L. S. Pelley, J. N. Riley, A. E. Sumner.

INSPECTION TRIPS

A. F. Metzger, *Chairman;* J. L. Coleman, Jr., J. F. Sasser.

LADIES ACTIVITIES

B. B. Reilly, *Chairman,* Mrs. B. B. Reilly, *Co-Chairman;* Mmes. W. A. Allen, J. H. Allison, J. C. Benson, E. J. Busch, G. M. Comstock, D. E. Hickey, D. B. Hicks, J. J. Kelly, D. W. Loucks, H. W. Lutz, G. J. Parros, H. H. Reich, E. H. Riesmeyer, Jr., J. N. Riley, T. F. Rockwell, C. H. Schneider, A. C. Schock, G. E. Smetak, R. M. Toucey.

PUBLIC RELATIONS

B. R. Small, *Chairman;* J. C. Benson, M. J. Hannah, I. C. Laux, J. N. Riley, E. A. Smith, R. J. J. Tennant.

RESERVATIONS

D. B. Hicks, *Chairman;* J. G. Beres, Edward Claitman, R. C. Firsching, J. F. Fleming, J. H. Llewellyn, Donald Martin, Charles Mitchell, R. A. Roos, L. G. Russell, Harold Shratter, C. W. Stanger, R. M. Toucey, L. B. Wilkes.

SESSIONS & FACILITIES

C. W. Stanger, *Chairman;* C. L. Benn, Walter Lambert, Jr., E. C. Smyers, R. F. Spreenberg.

SOCIETY ACTIVE IN EJC PROJECTS

With the Society now a member of *Engineers Joint Council*, our representatives have been active in its affairs. *EJC* was among the sponsors of a Conference on Engineering and Scientific Education Foundation of National Strength, held in Chicago on October 31 to November 2. Pres. P. B. Gordon, New York, designated Past Pres. John W. James, Chicago, Ill. and P. J. Marschall, also of Chicago, to represent the Society.

President Gordon has himself taken a prominent part in *EJC* having attended meetings of the Board of Directors on September 20 and November 15, and of the executive committee on September 22 and October 22. President Gordon also served as the Society representative at the Joint Assembly of *ECPD* and *EJC* held in New York on October 24-25.

At the September 21st meeting of the Executive Committee of the ASHAE Council, President Gordon reported that *EJC* had nominated T. Keith Glennon and Murrough P. O'Brien for appointment of the National Science Foundation Board in 1958 with Gen. L. B. Simon as alternate. The Committee requested that President Gordon draft a letter addressed to President Eisenhower expressing Society approval of the suggested nominations.

ACTIVITIES OF SOCIETY CHAPTERS

The chapters entered into the New Season with a number of stimulating programs. In addition to regularly featured Technical Talks, a few Panel Presentations were scheduled as well as a bit of Festivity. Plaudits were in order for outstanding members.

New Chapter Chartered at Johnstown, Pa.

The charter meeting of the 68th Chapter of the Society was held September 20 in the Fort Stanwix Hotel, Johnstown, Pa. with 94 present when Pres. P. B. Gordon, New York, presented the charter to the newly elected chapter president, Walter L. Ross.

John Everetts, Jr., Philadelphia, regional director of Region 1, opened the meeting and introduced the guests which included three Society past presidents, L. N. Hunter, John W. James and Merrill F. Blankin; Society Officers, E. R. Queer, first vice president, A. J. Hess, second vice president, C. H. Pesterfield, treasurer, and A. V. Hutchinson, executive secretary; Council Members, B. W. Farnes, Walter A. Grant and J. N. Livermore; also, W. J. Collins, Jr., chairman of the Publication Committee, P. H. Yeomans, member of the Committee on Research, T. F. Rockwell, chairman of the Committee on Arrangements for the 1958 Annual Meeting, E. K. Wagner, chairman of the Committee on Arrangements for the 1959 Annual Meeting, E. H. Riesmeyer, Jr., president of the Pittsburgh Chapter, and T. B. Focke, chairman of the Johnstown Chamber of Commerce.

Chairman Everetts introduced L. N. Hunter who welcomed the members and guests.

W. L. Ross introduced President Gordon who spoke on the problems of the contractor in the air conditioning of existing office buildings. He devoted his discussion mainly to multi-story structures and the special problems of heating and cooling with particular emphasis on distribution and cooling tower installations.

President Gordon presented the charter to Mr. Ross who expressed the thanks of the local chapter members.

At a brief business session the members approved the Chapter By-Laws and voted for the following slate of officers presented by L. N. Hunter, chairman of the Nominating Committee: *President* — W. L. Ross; *Vice President* — K. O. Schlentner; *Treasurer* — Sigmond Moroh; *Secretary* — J. K. Thornton; *Board of Governors* — L. F. Tierney (2 years) and H. F. Lenz (1 year).

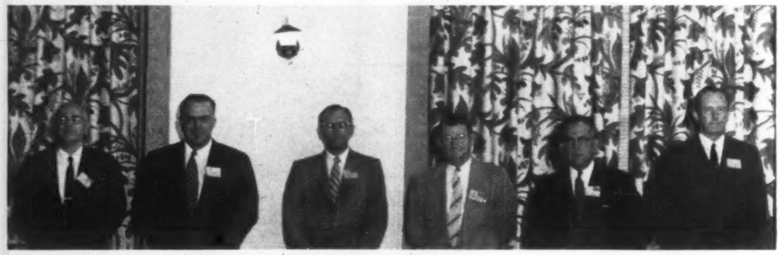
Second Vice President Hess presented the record books for the chapter to J. K. Thornton, the chapter secretary.

First Vice President E. R. Queer spoke briefly on the value of a chapter to the community and then presented a gavel to Chapter President Ross, a gift of the Jacksonville, Florida Chapter.

Karl Schlentner, the chapter vice president, announced that the speaker for the October meeting would be B. H. Jennings, Cleveland, director of the ASHAE Research Laboratory, after which the meeting adjourned.

Technical Talks

For the first meeting of the fall season, ARIZONA Chapter members were briefed on the history of the writing of the Phoenix City Code. The speaker was Delmar Browning, supervisor of mechanical inspectors, City of Phoenix. He discussed the inspection of undesirable installations, and expressed the belief that planning design and knowledge of code could help prevent such problems. A pointed and humorous question and answer period followed ● ● ● At a meeting of the BATON ROUGE Chapter, Charles Parker, Minneapolis-Honeywell Regulator Co., presented a program with slide illustrations on the use of blender valves in double duct air-conditioning systems. ● ● ● A discussion on the advantages of gas engine-driven refrigeration compressors for air-conditioning systems was given before an audience of EL PASO Chapter members. This topic was presented by N. K. Hall, manager, Refrigeration and Air-Conditioning Division, The Ready-Power Co., Detroit, Mich. ● ● ● EMPIRE STATE CAPITAL Chapter featured a group of talks on the general topic of controls. The first speaker, E. J. Mahoney, branch manager, Minneapolis-Honeywell Regulator Co., Albany, N.Y., addressed the group on *Controls—Yearround.* E. C. Doyle, branch manager, Johnson Service Co., Albany, then spoke on *Broadening the Controls Market in Hospitals.* A spirited discussion on *Electronic Control Centers* was given by G. G. Davis, consulting engineer, Glenn Davis Co., Schenectady, N.Y., and M. E. Waddell, branch manager, The Powers Regulator Co., Albany, delivered a masterful and, at times, humorous summation of *Individual Controls Products Developments*, climaxing a successful evening. ● ● ● An excellent program was presented at a FORT WORTH Chapter meeting by Victor Cole, Carrier Corporation, Syracuse, N.Y. The subject covered was the absorption system of refrigeration. Mr. Cole began with the basic principles of absorption refrigeration and continued through the current package absorption systems. Several interesting points were emphasized, including the statement that capacity could be varied from 0 to 100 percent through the use of only 1 control valve on the condenser. ● ● ● The *Past, Present and Future of the Heating and Ventilating Industry* was the subject treated by E. H. Beling, owner, Beling Engineering Co., Moline, Ill., before an ILLINOIS-IOWA Chapter audience. The program was well received. ● ● ● K. A. Hettinger, program chairman for a meeting of the INLAND EMPIRE Chapter, introduced Orville Bloebaum, regional sales manager, The Marley Co., San Francisco, who gave a comprehensive coverage on *Water Cooling Equipment for Air Conditioning and Refrigeration.* ● ● ● Two films, entitled *The How and Why of Centrifugal Pumps* and *Covering All Angles* (in pump selection), were presented and discussed at a JACKSONVILLE FLORIDA Chapter meeting by J. T. Graham, district sales manager, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. The films were followed by a question and answer session ● ● ● An extremely informative slide-illustrated talk covering centrifugal pumps was given by Jack Cable, Allis-Chalmers Manufacturing Co., Milwaukee, Wis., at a KANSAS CITY Chapter meeting. ● ● ● MEMPHIS Chapter members enjoyed a talk by William Gardiner, district sales engineer, Cyclotherm Division, National-U. S. Radiator Corp., Johnstown, Pa. His topic was *Package Generators and Heat Transmission Rates.* He enlivened the presentation by demonstrating a model of 1 type of boiler-burner unit. ● ● ● *The Characteristics of Forced Hot Water Heating Systems* were described by Frank Gall, sales promotion manager, Bell & Gossett Co., Morton Grove, Ill., for the benefit of the NORTH TEXAS Chapter members and their guests. Mr. Gall noted recent developments and improvements in design and installation. The talk was accompanied by charts and diagrams, as well as a working model of a pump with pressure gages to illustrate performance under different piping hookups. • • • NORTHEASTERN OKLAHOMA Chapter members heard an impressive talk by Donald Cousins, manager, merchandising department, The Marley Co., Kansas City, Mo. Slides were used during his discussion of *Water Cooling Equipment for Air Conditioning and Refrigeration.* • • • *Modern Pipe and Equipment Insulation* was the topic covered by S. L. North, president, North Brothers, Inc., Atlanta, Ga., at a NORTHERN PIEDMONT Chapter meeting. He evaluated the various materials available for insulation and stressed the common sense approach to the selection of proper materials and finishes for different applications and locations. Mr. North drew a clear picture of a relatively involved subject, presenting it in a form which was of general interest to all the members, not just to those directly concerned with specifying and using insulating materials. • • • The speaker for a ST. LOUIS Chapter meeting was William Carlisle, teacher at the Little Red Schoolhouse of Bell & Gossett Co., Morton Grove, Ill. Mr. Carlisle spoke to his audience on pump location air elimination for hot water heating systems. Live demonstrations and slides were used during the lecture. A standing vote of thanks was given to Mr. Carlisle for his excellent presentation. • • • The guest speaker at a SOUTH TEXAS Chapter meeting, E. V. Marshall, Chance Vought Aircraft, Dallas, Tex., covered some interesting points on *Air Conditioning High Speed Aircraft.* His talk was followed by a film presentation showing a new fighter plane. At another meeting of the SOUTH TEXAS Chapter, a talk by Banks Edwards, southern regional manager, Acme Industries, Inc., Jackson, Mich., *Water Cooled Condenser Problems and Solutions,* was well received by the members and guests. • • • *Special Environmental Stimulation* was the unusual subject selected by N. J. Cail, assistant chief engineer, Hardeman, Inc., Los Angeles, for his address at a meeting of the SOUTHERN CALIFORNIA Chapter. In the course of his presentation, Mr. Cail pointed out that larger test chambers will be utilized to test in-flight full scale missiles, thereby eliminating the empirical testing in favor of true in-flight conditions. High cost of actual missiles tested has made this program mandatory. In addition to the present test requirements of acceleration, lower pressures and reduced temperatures, the new problems to be coped with will be the dissociation of molecular oxygen to atomic oxygen, micrometeorite bombardment, atomic gases and cosmic rays. The figures concerning temperatures and pressures which were quoted in Mr. Cail's discussion were stimulating and opened new horizons for the members. • • • C. L. Herndon, assistant professor, San Antonio College, San Antonio, Tex., gave a 1-hour instructive discussion on *A Study of Economics of Air Cooled Condensers and Refrigeration Equipment* for a SOUTHWEST TEXAS Chapter audience. Professor Herndon's discussion included the advantages and disadvantages of air-cooled *vs.* water-cooled equipment. A discussion period followed. At a previous meeting of the SOUTHWEST TEXAS Chapter, the guest speaker, Ralph Fincke, Langhammer-Rummel Co., San Antonio, Tex., noted the *Problems in Control Application.* Mr. Fincke's presentation covered different types of controls, including 2-position, floating and electronic. • • • Vice Pres. C. R. Munn, WESTERN MASSACHUSETTS Chapter, introduced B. M. Packtor, Bernard M. Packtor Co., New Haven, Conn., who spoke to the chapter on *Pressure Effects of Pump Location Relative to the Compression Tank.* The subject was thoroughly discussed and graphically displayed by use of a miniature forced water system. • • • WISCONSIN Chapter scheduled a talk by W. J. Ortman, sales manager, defense installations, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. Mr. Ortman, who is a charter member of the North Jersey Chapter and who will be publicity chairman for the Society's 1958 Semi-Annual Meeting, gave an enlightening talk on the *Economics of Complete Year-round Air Conditioning.* After clearly explaning the meaning of complete air conditioning, he pointed out the percentage of new residential and commercial buildings being totally air conditioned and explained the technique of relating cost of air conditioning to total cost of doing business. Several types of buildings, such as factories, office buildings, churches, schools, etc., were discussed. The program was concluded by some interesting questions from the audience.



ASHAE Officers and Past Presidents at Johnstown Charter Meeting, September 20, 1957. (*l.* to *r.*) P. B. Gordon, president; L. N. Hunter and John W. James, past presidents; C. H. Pesterfield, treasurer; M. F. Blankin, past president; and T. B. Focke, president of the Greater Johnstown Chamber of Commerce

Officers of the newly chartered Johnstown, Pa. Chapter (*l.* to *r.*) Sigmond Moroh, treasurer; K. O. Schlentner, vice president; W. L. Ross, president; John Everetts, Jr. and L. Foster Tierney, members of board of governors; J. K. Thornton, secretary; and H. F. Lenz, member of board of governors

ASHAE Executives at the Johnstown Charter Meeting (*l.* to *r.*) A. V. Hutchinson, executive secretary; Walter A. Grant, member of Council; and E. R. Queer, 1st vice president

Panel Presentations

Five Columbus, Ohio, architects discussed *Air Conditioning As We See It and What We Expect from It* at a CENTRAL OHIO Chapter meeting. With Gerald Emerick acting as moderator, J. M. Seidel covered the residential scene, and J. P.

Schooley noted the commercial aspects of the picture. To complete the program C. C. Inscho treated the institutional field, and J. H. Holroyd, industrial problems. Several interesting points emerged from the talks. The statement was made that in any town where 15 to 20 percent of the office buildings have air conditioning, the other building owners feel compelled to follow. As industry becomes more automatic, it was noted, the heat load per square foot increases, with a corresponding need for air conditioning. The audience was told that even the small group of people who feel an aversion to air conditioning do not wish to do without it once they have it. • • • With C. R. Wherritt acting as moderator, a panel at a NEW MEXICO Chapter meeting sought answers to What is wrong with mechanical specifications? and How can closer cooperation be gained between architects, engineers, contractors, and suppliers? The membership took an active part in the discussion following the presentation by George Wright, architect; D. D. Paxton, engineer; L. E. Meyer, contractor; and W. L. Beale, supplier.

The New Season

To start the ball rolling for the new season Pres. A. W. Holland, BATON ROUGE Chapter, appointed the following committee chairmen: *Program*—W. J. LeBlanc; *Publicity*—C. W. Hogg, Jr.; *Codes*—D. W. Chesson; *Finance*—Gustave Pailet; *Membership*—R. T. Collier; *Out-of-town-Membership*—A. C. Chappuis; *New Products*—R. P. Thibodaux; and *Attendance*—G. M. Guynn. • • • At an ILLINOIS-IOWA meeting, R. L. Graham, retiring president, presented the Chapter charter to W. W. Dodge, incoming president. Mr. Dodge summarized the accomplishments of the chapter during the first year of operation and outlined his aims, intentions and hopes for the coming year. • • • J. G. Coleman was elected to the office of treasurer by unanimous vote of the MEMPHIS Chapter to fill the vacancy created by the resignation of H. A. Boudolf, who found it necessary to decline service because of extended absence from the city. • • • A request for suggestions for meeting programs was made to the membership of the NEBRASKA Chapter by Pres. M. F. Stober. A number of constructive suggestions were forthcoming. • • • C. C. Quin, A. B. Banowsky and C. L. Fleming were unanimously elected to constitute a nominating committee for the SOUTH TEXAS Chapter. Vice Pres. A. B. Ullrich, Jr., appointed Mr. Fleming to serve as chairman of the group.

Plaudits

In a ceremony conducted at an ARIZONA Chapter meeting, J. B. Hoaglund was presented his past president's pin and given a sincere hand of appreciation by all present. • • • Pres. C. R. Gardner, FORT WORTH Chapter, complimented H. M. Cunningham and J. T. Threadgill for their efforts and cooperation in manufacturing and mailing the *Texas-sized* gavel, which was presented to the Jacksonville Florida Chapter. The gavel, constructed of Texas Bois'd Arc, was 4½ x 8½ in. and weighed 4½ lb. The attention of the Fort Worth Chapter members was also drawn to the *very nice* publication by the *young* (but not quite so young) Austin Chapter. • • • At a NORTH TEXAS meeting, Pres. G. H. Meffert complimented the Chapter for supplying several members as speakers at recent meetings of other nearby chapters. • • • J. I. Levenhagen, ST. LOUIS Chapter editor, expressed his thanks to G. B. Pattiz for an excellent job of publishing the September issue of the *St. Louis BTUES* while Mr. Levenhagen was on vacation. • • • Pres. C. L. Herndon, SOUTHWEST TEXAS Chapter, presented the past president's pin to Boone Crisp, the outgoing president. Everyone congratulated Mr. Crisp on his performance as president.

Oregon Chapter Festivity

Before starting the new season, OREGON Chapter held its annual stag picnic. The committee chairman, F. T. Taylor, reported an attendance of 138. The day's activities included baseball, horseshoes, a corn-husking bee, and the consumption of 125 lbs of roast beef at a copious barbecue spread. Everyone was overjoyed by the appearance of Ross Mudge, who arrived with the respiratory equipment which is assisting his battle against polio.

HONORED BY LIFE MEMBERSHIP

by recent action of Society's Council

Charles G. Binder

Merchantville, N.J.: ▶ Served for 27 years as manager, engineering application department, Warren Webster & Co., Camden, N.J.

▶ Received M.E. from Pennsylvania State University, 1912; studied thermodynamics at Sorbonne.

▶ Worked for Department of Architecture, State of New York, previous to World War I service, 303rd Engineers, U. S. Army.

▶ Retired in 1948; has spent considerable time traveling in Europe.

Edward R. Downe

Elyria, Ohio: ▶ Has been product engineer and vice president, research & development, C. A. Olsen Manufacturing Co., since 1943.

▶ Granted B.S. in mechanical engineering, Worcester Polytechnic Institute, 1910.

▶ Served as captain, Corps of Engineers, A.E.F., 1917-19.

▶ Was chief engineer, Bryant Heater Co., Cleveland, 1938-42.

▶ Holds membership *A.G.A.* and *NWAH & ACA* committee, *ASRE*.

Glen M. Comstock

Pittsburgh, Pa.: ▶ Established as sales representative for L. J. Wing Manufacturing Co. and The Velan Steam Specialties, Inc., 25 years ago; offices in Pittsburgh.

▶ Worked way through Sheffield Scientific School, Yale University; B.S., civil engineering, 1912.

▶ Gained early experience in machine design, drafting, steam and hydraulic engineering.

▶ Employed by Rush Machinery Co., 1925-32, finally as vice pres.

Jose M. Lenone

Chicago, Ill.: ▶ Is a designing engineer with the Corps of Engineers, U. S. A., Chicago District.

▶ Spent 30 years as a designing engineer in the meat-packing industry, associated first with Armour & Co.; later, Wilson & Co.

▶ Attended Stevens Institute of Technology, M.E. in 1902.

▶ Active duty with Corps of Engineers, 1940-44.

▶ Engaged in boiler plant design, conditioning for product control.

Journal Section

Life Members, *cont.*

John L. Pfuhler

Port Richmond, Staten Island, N.Y.:

- Born in Castleton Corners, Staten Island.
- Started in his father's plumbing and heating business over 50 years ago.
- Worked successively as helper, journeyman and manager for John Pfuhler, Sr.
- Became proprietor of the business in 1920 and has operated it ever since.
- Specialized in hot water and steam heating.
- Joined the Society in 1923, and affiliated that same year with the New York Chapter.

MIN LEAVES LABORATORY

On September 15 T. C. Min, research engineer on the staff of the ASHAE Research Laboratory, resigned to become associate professor of mechanical engineering at Alabama Polytechnic Institute, Auburn, Ala.

Since joining the research staff in July 1954 as research engineer, Mr. Min was engaged in a number of the active projects on the Society research program. Recently he had been in charge of the project on infiltration through doors.

Mr. Min became a Junior Member of the Society in 1951 and was advanced to Member grade in 1956. He carries the best wishes of the whole Society organization with him to his new position.

WHAT SOCIETY COMMITTEES ARE DOING

Society committees reach their peak of activity in the fall, although their work is really continuous. Highlights of recent meetings are reported here. A number of committees not mentioned at this time have been active, but have not held formal meetings.

Council Committees

The Finance and the Executive Committees of the Council of the Society both met in Pittsburgh on September 21, and again in Cleveland on October 11.

Both sets of meetings were largely preparatory to the fall meeting of the Council in Cleveland on October 12. Topics considered included the 1958 Budget, a proposed pension and insurance plan, *EJC* activities, special branches, Society participation in several suggested joint activities with other groups, future meeting plans, honors and awards, By-Law amendments, and numerous other more or less routine matters.

Committee on Research

The full committee met at the Laboratory in Cleveland on September 4, with 12 of the 14 members in attendance. The new Director of Research, Mr. Jennings, was in attendance for the first time in his new capacity. Since the meeting followed one held by the Research Executive Committee on August 26, and since this was the first formal meeting of the whole committee since February, it was an exceedingly busy session.

A review of what is going on in connection with the various projects active at the Laboratory was presented by members of the staff.

The remodeling of the Environment Laboratory is proceeding. Fabrication of the ceiling plenum system has been started, and work has started on the layout of equipment to be installed on the main floor of the Laboratory. It is expected that the Laboratory will shortly get under way with a large number of studies concerned with the relationship of heating and cooling to comfort. Many aspects of radiant heating or cooling will be investigated, largely in regard to the effect of walls at different temperatures on the occupants (asymmetrical radiation). This will supplement previous work which has been done in the Laboratory in which the emphasis has been more specifically on the actual heating or cooling of a place without regard to the occupants in the space.

The solar calorimeter is now being used for the study of shading of sunlit glass by means of awnings. The awning program is divided into a canvas-awning and metal-awning study. The experimentation has been completed for the canvas awning program which included a plastic awning. The analysis of the test results is now in progress. Five metal awnings in all will be tested.

The Navy Sound Program is to determine the noise-attenuation-and-generation characteristics of shipboard ventilating system components. The program was activated with a meeting on June 7 to discuss range of conditions and types of fittings to be studied. A program outline has been made and will be submitted to the Bureau of Ships at a meeting in the near future. The test duct system has been planned and space requirements in the Laboratory have been surveyed.

Variables in the odor program have been held to a minimum by holding air conditions to 75 deg DB and 50 percent RH, and by using pure vapors to avoid fractionization. Four fabrics, namely, rayon, nylon, cotton, and wool have been tested with iso-amyl acetate as the odorant; and the bottle technique was the method used. The syringe technique is now being used, and it appears to be simpler, faster, and more reliable than the bottle technique.

The entrance infiltation project has progressed to a point where a paper reporting the results is under review by staff members.

The Laboratory has recently been requested to investigate the flow of steam and condensate in copper tubing, particularly as related to small tube sizes. It is expected that an analytical study in this connection will be made, followed by such experimental work as may be deemed necessary.

Presentation of a proposed research budget for 1958 showed a figure of over $275,000 — to support a considerably expanded program.

It was noted that the proposed brochure for describing and promoting the Society research activities is expected to be ready for distribution shortly. The committee also authorized details in connection with a Certificate of Recognition to be awarded to those who support the research program through contribution of funds.

The TAC on Plant and Animal Husbandry recommended that a search of the literature be undertaken on the relation of environmental conditions to plant and animal husbandry. This was routed to the newly formed Joint Committee of the Society and the *American Society of Agricultural Engineers.*

The Subcommittee on Infiltration of the TAC on Heating and Air-Conditioning Loads had recommended that an additional study be made on the variation of inside-outside pressure differentials at various heights in tall buildings under winter heating conditions. The Committee on Research affirmed the action of the Research Executive Committee in accepting the recommendation and directed its incorporation in so far as possible into the program on infiltration through doors.

A Research Building Committee of three members was appointed to work with the Director of Research in connection with problems connected with the Research Laboratory building.

Other topics actively considered at the meeting included the Stevens Bequest, specific testing, revision of the operational guide of the committee, possible revisions in the Laboratory staff employment agreement, and future plans and proposals.

Technical Advisory Committees

The Steering Committee on Pulsations and Resonance which is a sub-committee of the TAC on Combustion met at Battelle Memorial Institute in Columbus, Ohio on September 26. This is the group which is directing the cooperative research project at Battelle.

On October 24th, the TAC on Hot Water and Steam Heating met at the Laboratory at Cleveland.

Public Relations Committee

Pittsburgh was the location for an all-day meeting of the Public Relations Committee on September 21. Details of plans having to do with the Society exhibit at the Canadian Power Show in Toronto in October were discussed and finalized. The possibility of encouraging individual chapters of the Society to concern themselves with local re-employment of retired or semi-retired personnel was considered but without committee action being taken. It was decided that a conference of chapter editors should be encouraged as a scheduled program event at the coming Pittsburgh meeting in January. Plans for local publicity to assist in promoting and publicizing the Pittsburgh meeting were discussed with representatives of the Pittsburgh Chapter. As a result, it is expected that the local press and other publicity channels will give attention to the meeting.

CANDIDATES FOR MEMBERSHIP

Listed here are the names of 99 men who are candidates for membership or advancement in membership grade. Members are requested to assume their full share of responsibility of receiving these candidates into membership by advising the Executive Secretary before November 30, 1957, of any whose eligibility for membership is questioned. Unless such objection is made these candidates will be voted on by the Council.

*Note: *Advancement †Reinstatement*

Arkansas (*Region* 6)

Riddick, E. K., Jr., Cons. Engr., Erhart, Eichenbaum, Rauch & Blass, Little Rock.

California (*Region* 4)

Allen, J. J., Staff Engr., Plt. Engrg., Hughes Aircraft Co., Culver City.

Dickerson, D. F., Design Engr., Ernest H. Lee, Hughes Aircraft Co., Culver City.

Fear, J. L., Sales Engr., Barber Colman Co., Pasadena.

Graham, L. W., Mech. Engr., Tegart Engineers, Culver City.

Horecki, W. R., Design Engr., Ernest H. Lee, Hughes Aircraft Co., Culver City.

Nash, E. G., Engr., Htg.-Vtg., Hughes Aircraft Co., Culver City.

Spielberg, Charles, Facilities Staff Engr., Hughes Aircraft Co., Culver City.

Florida (*Region* 5)

Clark, P. M., Technician, Johnson Service Co., Jacksonville.

Thomas, L. J., Assoc., Bernard A. Thomas & Assocs., Jacksonville.

Vreudenberg, A. J., Engr., Boye's, Ft. Lauderdale.

Watkins, W. O.†, Supt. & Engr., McCall Fuel Service, Inc., Jacksonville.

Georgia (*Region* 5)

Baker, J. H., Asst. Mgr., Baker's, Inc., Savannah.

Courtenay, C. M., Mgr., McKenna Supply Co., Savannah.

Gnann, A. P., Jr., Div. Mgr., South Atlantic Gas Co., Savannah.

Goodwin, H. W., Chief Engr., Huffman-Wolfe Southern Corp., Atlanta.

Halligan, T. J., Repr., Chatham Pipe & Supply Co., Savannah.

Hume, R. L., Br. Mgr., North Brothers, Savannah.

Humphrey, E. E., Jr., Partner, Humphrey Brothers Heating & Air Conditioning, Savannah.

Kinser, R. E., Engr., Erickson's Inc., Savannah.

Ormond, A. C., Chief Design Engr., Union Bag-Camp Paper Corp., Savannah.

Schwier, R. R., Estimator, Cecil C. Pacetti & Son, Savannah.

Waller, E. F., Sales Engr., Mingledorff's, Inc., Savannah.

Wood, D. E., Office Engr., Stone & Webster Engineering Corp., Savannah.

Illinois (*Region* 2)

Dragelin, N. G., Sales Engr., Johnson & Heckel, Chicago.

Indiana (*Region* 2)

Bishop, B. H., Sales & Service, The North American Mogul Products Co., Indianapolis.

Phillips, W. A., Mech. Engr., Yeager Architects, Inc., Terre Haute.

Louisiana (*Region* 5)

Smith, S. G., Vice Pres., Bedell & Nelson Engineers, Inc., New Orleans.

Maryland (*Region* 5)

Sheirer, W. J., Partner, Aircon Engineering & Supply Co., Cumberland.

Massachusetts (*Region* 1)

Duffany, L. N., Pres., Allied Wholesale Heating Co., Brockton.

Stagliano, C. J., Repr., Whitty Co., Inc., Boston.

Missouri (*Region* 3)

Belchik, S. J., Section Leader Mech. Dept., Leo A. Daly Co., St. Louis.

Brueggeman, D. G., Asst. Supvsr. Mech. Designing, McDonnell Aircraft Corp., St. Louis.

Hesemann, Q. C., Engr., Kuenz Heating & Sheet Metal Co., Pinelawn.

Johnson, C. L., Research Chemical Engr., Gustin-Bacon Mfg. Co., Kansas City.

Kunz, P. O., Sr. Engr., Laclede Gas Co., St. Louis.

Lyall, L. M. Jr., Br. Mgr., National-U. S. Radiator Corp., St. Louis.

New York (*Region* 1)

Bormann, R. H.†, Br. Com. Sales Mgr., Minneapolis-Honeywell Regulator Co., Syracuse.

Brown, D. W., Mech. Engr., G. A. Fuller Co., New York.

Klingher, M. H.*, Dist. Mgr., Typhoon Air Conditioning Co., Div. of Hupp Corp., Brooklyn.

Metcalf, E. T., Cons. Engr., Baldwin, L. I.

Schoenbaum, G. H., Sec. Head, Standard Oil Co. (N.J.), Marketing Coordination Dept., New York.

Singer, S. L., Vice Pres. in charge of Sales, Original Consumers Oil Heating Corp., New York.

Shaffro, L. A., Vice Pres., Sidney Samuels, Inc., New York.

Whiting, W. E., Proj. Engr., Lederle Laboratories Div., American Cyanamid Co., Pearl River.

Windman, A. L., Supvsr., Syska & Hennessy, Inc., New York.

Ohio (*Region* 2)

Greiser, R. V., Sales Engr., Gray Bar Electric Co., Toledo.

Hill, G. B., Sales Repr., Lunkenheimer Co., Cincinnati.

Knox, J. H., Jr., Sales Engr., Johnson Service Co., Toledo.

Meckler, Milton, Sr. Dvlpt. Engr., Surface Combustion Corp., Toledo.

Porter, V. B., Pres. & Gen. Mgr., Stoker Sales & Service Co., Toledo.

Poynter, R. L., Estimator, American Radiator & Standard Sanitary Corp., Toledo.

Pennsylvania (*Region* 1)

Barnhart, C. D., Treas., Stanton-Barnhart Plumbing & Heating Co., Johnstown.

Barnhart, C. V., Vice Pres., Stanton-Barnhart Plumbing & Heating Co., Johnstown.

Blackford, D. J., Research Lab. Supvsr., National-U. S. Radiator Corp., Johnstown.

Camut, J. S., Htg. A-C. Repr., American Standard Supply Div., Johnstown.

de Pass, J. G., Asst. Secy. & Gen. Credit Mgr., National-U. S. Radiator Corp., Johnstown.

Grossinger, J. S., Dvlpt. Engr., National-U. S. Radiator Corp., Johnstown.

Kisko, E. F., Sr. Tech., National-U.S. Radiator Corp., Johnstown.

Pineau, C. F., Pres., Radiant Steel Products Co., Williamsport.

Ranck, R. D., Com. Customer Repr., West Penn Power Co., Greensburg.

Reynolds, G. L., Dir. of Mfg. Engrg., National-U. S. Radiator Corp., Johnstown.

Rizzo, F. J., Sr. Model Maker, National-U. S. Radiator Corp., Johnstown.

Rowland, J. W., Partner, Rowland & Emeigh, Johnstown.

Shaffer, K. L., Field Engr., National-U.S. Radiator Corp., Johnstown.

Springer, E. W., Asst. to Chief Plt. Engr., National-U.S. Radiator Corp., Johnstown.

Walker, R. T., Treas., National-U.S. Radiator Corp., Johnstown.

Weakland, R. B., Owner, Russell B. Weakland, Cresson.

Weakland, T. R., Pipe Gen. Foreman, Mid Valley Constructors, Inc., Cresson.

Texas (*Region* 6)

Beatty, J. W., Owner, Beatty Engineering Co., Dallas.

Mallett, C. B., Jr.†, Power Service Engr., Dallas Power & Light Co., Dallas.

McVean, N. W., Pres., Universal Sheet Metal Co., Ft. Worth.

Wisconsin (*Region* 2)

Spahr, D. G., Sales Engr., Mueller Climatrol Div., Worthington Corp., Milwaukee.

Canada (*Region* 7)

Brants, Henry, Vice Pres. & Gen. Mgr., Jas. A. Kearny & Assoc., Montreal, Que.

Edge, J. A., Engr., Wiggs, Walford, Frost & Lindsay, Montreal, Que.

Galarneau, A. G., Proj. Mgr., The Rankin Co., Ltd., Montreal, Que.

Gauthier, Russel, Assoc., LeFrancois & Gauthier, Montreal, Que.

Gibson, R. B., Sales Engr., Trane Co. of Canada Ltd., Edmonton, Alta.

Howard, C. E., Mgr. Government Dept., Canadian Johns-Manville Co. Ltd., Ottawa, Ont.

Husband, A. C., Sales Engr., E. H. Price (B.C.) Ltd., Vancouver, B.C.

Lambert, E. H., Cons. Engr., Toronto, Ont.

McNeilage, D. G., Repr. Boiler Div., Dominion Bridge Co., Ltd., Toronto, Ont.

Nicol, W. J., Dist. (Ontario) Mgr., National Heating Products, Ltd., Toronto, Ont.

Quance, H. F., Sales Engr., Ruud Manufacturing Co., Toronto, Ont.

Ramage, E. G., Tech. Repr., F. Drexel Co., Ltd., Vancouver, B. C.

Rennie, J. H., Bldg. Engr., Royalite Oil Co., Ltd., Calgary, Alta.

Ridge, E. I.†, Div. Mgr., Canadian Fairbanks Morse Co., Winnipeg, Man.

Roots, W. K., Managing Dir. & Chief Engr., Pioneer Controls Ltd., Brandon, Manitoba.

Self, L. G. M., Canadian Sales Mgr., Rheem International, Port Credit, Ont.

Sharpe, S. G., Pres. & Gen. Mgr., F. H. Lepper & Co., Calgary, Alta.

Smith, T. G., Sales Engr., Sheldons Engineering Ltd., Montreal, Que.

Stirling, L. M., Pres., Canada Fans Ltd., Montreal, Que.

Tiivel, Ernst, Design Supvsr., Aluminum Company of Canada, Montreal, Que.

Turnbull, A. W., Mech. Design Engr., British Columbia Electric Co., Vancouver, B.C.

Wortley, E. W., Repr., Arthur S. Leitch Co., Ltd., Downsview, Ont.

England

Bayes, J. D., Tech. Engr., G. N. Haden & Sons, Ltd., London.

Malaya

Hwang, J. I., Chief Engr., Condair Engineering Ltd., Singapore.

South Africa

Wilson, R. E., Proj. Engr., Matthew Hall (PTY) Ltd., Capetown.

Southern Rhodesia

Thacker, J. E.†, Cons. Engr., Sanco Consolidated, Ltd., Salisbury.

(For most recent listing of Society committee personnel see Frontispiece, JOURNAL SECTION*)*

Regional Organization of Society Chapters

The 69 Chapters and 6 Student Branches in North America are divided into 7 geographical groups, and each group is designated as a Regional Area. A Regional Director (names listed below) is elected by the Society membership for each Regional Area. These 7 Regional Directors and the 2nd Vice President of the Society, acting as chairman, constitute the Regions Central Committee.

There is also a Chapters Regional Committee for each Regional Area, and the members and alternate members of each of these committees are listed below, with the Regional Director as chairman.

Regions Central Comm. A. J. Hess, Chairman	Regional Areas	Chapters Regional Committees		
		Chapter	Member	Alternate
No. 1 **John Everetts, Jr.** **Chairman**	Conn.	Connecticut (New Haven)	Walter Heywood, Jr.	Fritz Honerkamp
	Del., Maine			
	Mass.	Massachusetts (Boston)	W. G. Martin, Jr.	E. L. Blair
	Mass.	Western Massachusetts (Springfield)	A. M. Lovenberg	F. A. Ferraro
	N. H.			
	N. J.	North Jersey (Newark)	Martin Christesen	S. H. Nitzberg
	N. Y.	Central New York (Syracuse)	L. A. Childs	S. F. Gilman
	N. Y.	Empire State Capital (Albany)	G. G. Davis	R. B. Taylor
	N. Y.	New York	Albert Giannini	J. B. Hewett
	N. Y.	Western New York (Buffalo)	C. W. Stone	G. E. Kuhn
	Pa.	Philadelphia	E. K. Wagner	P. H. Yeomans
	Pa.	Pittsburgh	R. M. Toucey	E. H. Riesmeyer, Jr.
	Pa.	Johnstown		
	R. I., Vt.			
No. 2 **P. J. Marschall** **Chairman**	Ill.	Illinois (Chicago)	H. G. Gragg	
	Ind.	Indiana (Indianapolis)	James Jackson	A. O. Roche, Jr.
	Mich.	Michigan (Detroit)	E. F. Glanz	P. S. Hosman
	Mich.	Western Michigan (Grand Rapids)	F. L. Murray	B. J. Walter
	Ohio	Central Ohio (Columbus)	R. A. Wilson	W. A. Schoonover
	Ohio	Cincinnati	R. G. Anderson	T. D. Reiley
	Ohio	Miami Valley (Dayton)	J. B. Rishel	L. P. Brehm
	Ohio	Northern Ohio (Cleveland)	H. R. Canoyer	J. A. White
	Ohio	Toledo	J. F. Guest	J. M. Groskopf
	Wis.	Wisconsin (Milwaukee)	H. W. Alyea	R. D. Rodwell
No. 3 **A. B. Algren** **Chairman**	Colo.	Rocky Mountain (Denver)	A. S. Widdowfield	L. L. DeLong
	Iowa	Iowa (Des Moines)	R. S. Stover	W. A. Schworm
	Iowa	Illinois - Iowa (Moline, Ill.)	R. L. Graham	W. W. Dodge
	Kan.	Kansas (Wichita)	T. L. Roberts	J. C. Mikesell
	Minn.	Minnesota (Minneapolis)	E. T. Erickson	Fred Vogt
	Mo.	Kansas City	S. C. McCann	J. C. Fasnacht
	Mo.	St. Louis	N. J. Hubbuch	W. P. Norris
	Mont.			
	Neb.	Nebraska (Omaha)	M. F. Stober	F. P. Manchester, Jr.
	N. D., S. D., Wyo.			
No. 4 **W. O. Stewart** **Chairman**	Ariz.	Arizona (Phoenix)	J. B. Hoaglund	E. P. Maxwell
	Calif.	Golden Gate (San Francisco)	J. E. Murray	K. F. Baldwin, Jr.
	Calif.	Sacramento Valley (Sacramento)	V. W. Thornburg	M. J. Delavan
	Calif.	Southern California (Los Angeles)	H. F. Ulovec	W. J. Biggar
	Idaho, Nevada			
	Ore.	Oregon (Portland)	W. B. Hayes	W. R. Norte
	Utah	Utah (Salt Lake City)	R. V. Oliver	D. B. Holford
	Wash.	Puget Sound (Seattle)	E. W. Triol	M. W. McKinstry
	Wash.	Inland Empire (Spokane)	J. A. Doyle	Max Tonn
No. 5 **C. B. Gamble** **Chairman**	Ala.,			
	Fla.	Jacksonville		
	Ga.	Atlanta	J. A. Marshall	J. S. Edgar
	Ky.	Bluegrass (Louisville)	W. J. Killian	O. J. Hill
	La.	Delta (New Orleans)	J. H. Maloney	I. M. Richardson
	La.	Baton Rouge	J. F. Naylor, Jr.	A. J. Mayers, Jr.
	Md.	Baltimore	W. G. Robertson, Jr.	R. E. Dressell
	Miss.	Mississippi (Jackson)	D. F. Ingram	F. H. North
	N. C.	Northern Piedmont (Greensboro)	J. E. Hart	C. E. Amick
	N. C.	Southern Piedmont (Charlotte)	W. P. Wells	J. R. Clark
	S. C.	South Carolina (Columbia)	J. E. McMurray	B. A. Leppard
	Tenn.	Memphis	G. B. Ramsey	H. H. Wilson
	Va.	Virginia (Norfolk)	D. C. Delinger	D. L. Gusler
	D. C.	Washington, D. C.	P. R. Achenbach	H. W. Rush
	W. Va.			
No. 6 **D. M. Mills** **Chairman**	Ark.	Arkansas (Little Rock)	J. W. Thompson	Allen Bullard
	La.	Shreveport	J. S. Malahy, Jr.	
	N. Mex.	New Mexico (Albuquerque)	F. H. Bridgers	J. K. James
	Okla.	Northeastern Oklahoma (Tulsa)	C. H. Dollmeyer	J. D. Ryan
	Okla.	Oklahoma (Oklahoma City)	F. R. Denham	W. R. Johnson
	Texas	Austin	A. C. Lagow	B. J. Barnhart
	Texas	El Paso	J. O. LeBeau, Jr.	M. D. Goodwin
	Texas	North Texas (Dallas)	G. H. Meffert	O. H. Mehl
	Texas	South Texas (Houston)	E. B. Appling	W. A. Sharp
	Texas	Southwest Texas (San Antonio)	D. T. Kern	O. A. Brynie
	Texas	West Texas (Lubbock)	B. C. Melanson	T. F. Sartor
	Texas	Fort Worth	C. R. Gardner	T. B. Romine, Jr.
No. 7 **W. G. Hole** **Chairman**	B. C.	British Columbia (Vancouver)	A. C. Martin	W. F. Keenan
	Man.	Manitoba (Winnipeg)	R. M. Fraser	H. F. Randall
	Que.	Montreal	D. L. Lindsay	H. G. S. Murray
	Que.	Châpitre de la Ville de Québec	P. J. Lamarche	Jean Veilleux
	Ont.	Ontario (Toronto)	C. L. Torry	Jack Thompson
	Ont.	Ottawa Valley (Ottawa)	C. W. Watson	Jacob Klassen
	Alta.	Northern Alberta (Edmonton)	W. C. Woods	P. M. Butler

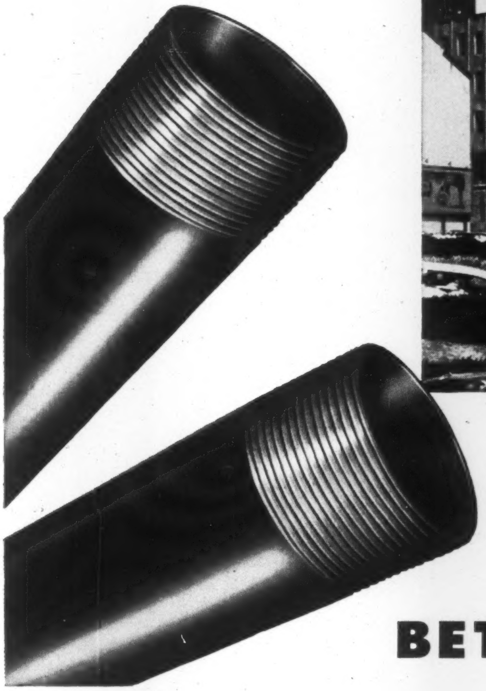
New Office Building in Baltimore Has Beth-Co-Weld Piping

This attractive new structure is the Commercial Credit Building, the first major office building erected in Baltimore in a quarter-century. The 20-story building is faced with granite and aluminum, and has a basement garage for 250 cars. Beth-Co-Weld steel pipe is used for the plumbing and heating piping, as well as for the conduit for the electrical system.

Beth-Co-Weld steel pipe is ideal for all kinds of general-purpose piping because it's so strong, so sound. And with Beth-Co-Weld, installations proceed at a steady pace because it's such easy pipe to cut, thread and weld.

Beth-Co-Weld comes black and galvanized, standard weight and extra-strong, in all sizes from ½ in. through 4 in. It is regularly furnished in 21-ft lengths, plus or minus 1 in., and in random and cut lengths. The next time you need pipe, ask your jobber for Beth-Co-Weld.

Plumbing and Heating, Air Conditioning and Electrical Contractor: Riggs Distler & Co., Inc., Baltimore. *Pipe Distributor:* Noland Co., Washington Branch.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

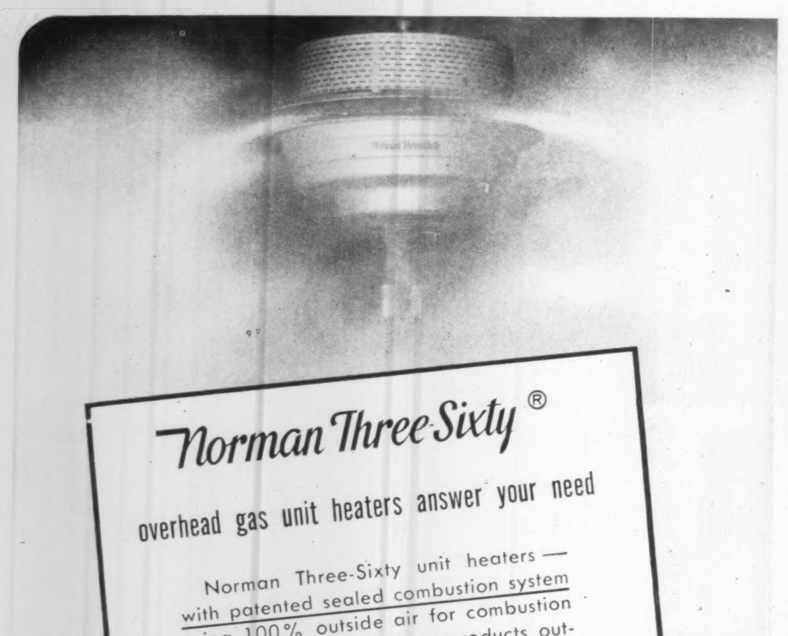
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

AN UMBRELLA OF COMFORT . . . OR SPOT HEATING

Norman Three-Sixty®

WITH SEALED COMBUSTION



Norman Three-Sixty®

overhead gas unit heaters answer your need

Norman Three-Sixty unit heaters — with patented sealed combustion system using 100% outside air for combustion and removing combustion products outside under positive pressure — offer a wide range of applications. They are especially applicable in restaurants and food marts where flue gases threaten contamination, and wherever exhaust fans create a negative pressure.

Norman Three-Sixty Radial-Flo models gently distribute a complete circle of warm air outward and downward to the floor. Uniform temperature is maintained without hot blasts, cold spots, drafts or pockets of stale air.

write us today for descriptive literature

Both types of units are available with inputs of 85,000 and 115,000 BTU/hr. Units of both sizes and both types can be used together to meet a wide range of heating requirements.

For high ceiling and doorway applications, the Norman Three-Sixty Down-Blo units blast heat directly downward through the bottom of the unit. Before striking the floor, the heat spreads to cover a wide area with gentle warmth.

Norman® products company • 1156 chesapeake ave. columbus 12, ohio

IN CANADA: A. D. PALMER & CO., Lethbridge, Alberta • Port Credit, Ontario

Here's How KENNEDY'S Kenalloy Stem and Union Bonnet Are Made for Better Service... Easier Operation...

Fig. 525

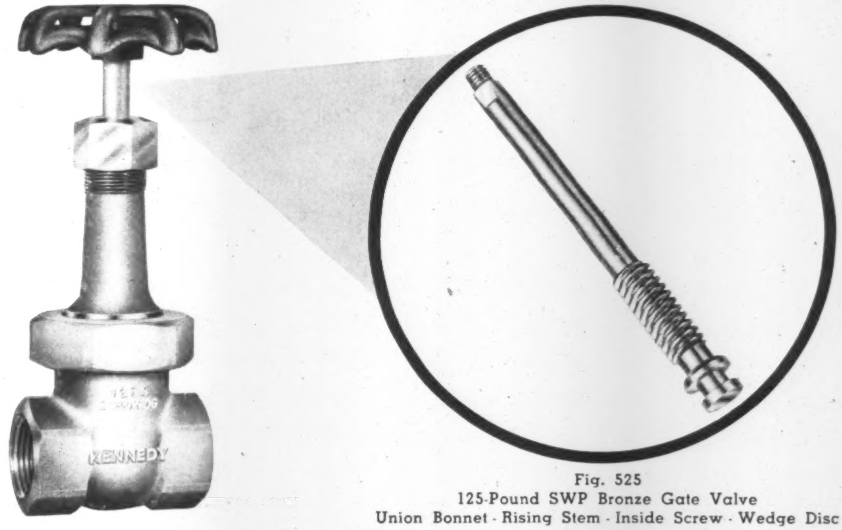
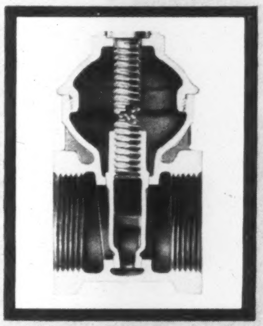
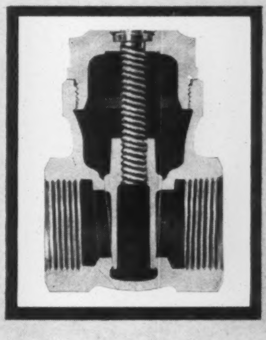


Fig. 525
125-Pound SWP Bronze Gate Valve
Union Bonnet - Rising Stem - Inside Screw - Wedge Disc

In bronze body valves, stems made of ordinary metals are subject to a form of corrosion known as dezincification. Many fluids attack such stems in such a way as to cause the zinc to be entirely removed from the alloy. This sort of corrosion leaves the stem in a porous, very weak condition and it soon breaks in service.



Kennedy bronze body valve stems are made from a specially developed metal called **KENALLOY**. This alloy is powerfully inhibited against dezincification, as well as many other types of corrosion, and it is a long wearing metal. KENALLOY produces beautiful, non-galling smooth threads and bearing surfaces to make the valve easier to operate and it assures far longer life in the "heart" of the valve.



These additional advantages make KENNEDY your best valve buy...

Kennedy's Union Bonnet permits repeated dismantling for cleaning or inspection and reassembly without danger of distortion of the valve. The bronze-to-bronze construction makes a tight union for tight, leakproof operation.

Heavy bronze union bonnet ring is entirely separate from the bonnet to eliminate any possibility of springing the bonnet joint face when assembling or disassembling the valve.

The cylindrical body withstands sudden pressure. Kennedy's Cylindrical Body construction resists rupture and minimizes deflection when under severe pressure. Pressure in ordinary valves tries to push body wall out. Rupturing stresses concentrate where wall has the shortest radius. This deflection causes early valve failure.

Wider hex ends, blended into body, prevent distortion. On conventional valve bodies hex ends protrude from the body and are connected by thin body wrists. This area under severe wrench pressure can distort and cause disc seating trouble. Kennedy's wider hex ends are blended into body making the body and hexes one unit. In this way wrench pressures can be absorbed.

• *YOU CAN'T BUY A BETTER VALVE THEN A KENNEDY!*

KV

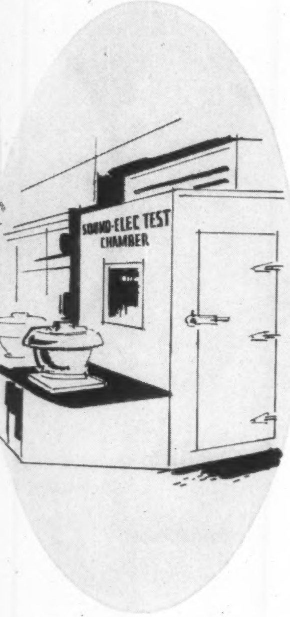
KENNEDY VALVE MFG. CO.
1607 EAST WATER ST., *ELMIRA, NEW YORK*
VALVES • PIPE FITTINGS • FIRE HYDRANTS

• OFFICES AND WAREHOUSES IN NEW YORK, CHICAGO, SEATTLE, SAN FRANCISCO, ATLANTA • SALES REPRESENTATIVES IN PRINCIPAL CITIES •

1

FOLLOW THROUGH ENGINEERING.

From drafting board to final product, a single policy dictates Jenn-Air engineering: Jenn-Air exhausters must be better designed. Primary objective is—how well can we make the products? . . . not how cheaply or how quickly.



2

FOLLOW THROUGH MANUFACTURING.

Jenn-Air exhausters are constructed of ageless spun aluminum and stainless steel—motors lubricated for 10 years of normal operation. Each unit must pass final scrutiny of exacting vibronic Eye to guarantee minimum vibration—low noise level.

3

FOLLOW THROUGH SERVICE.

Jenn-Air's sense of responsibility never diminishes. Fifty-two national sales offices with 66 warehouse stocks—field engineers everywhere—provide the fastest over-night service throughout the U.S.A., the easiest-to-obtain consultation.

WHY IS JENN-AIR BETTER THAN "OR EQUAL"?

FOLLOW THROUGH ENGINEERING—MANUFACTURING—SERVICE MAKE THE BIG DIFFERENCE IN JENN-AIR POWER EXHAUSTERS

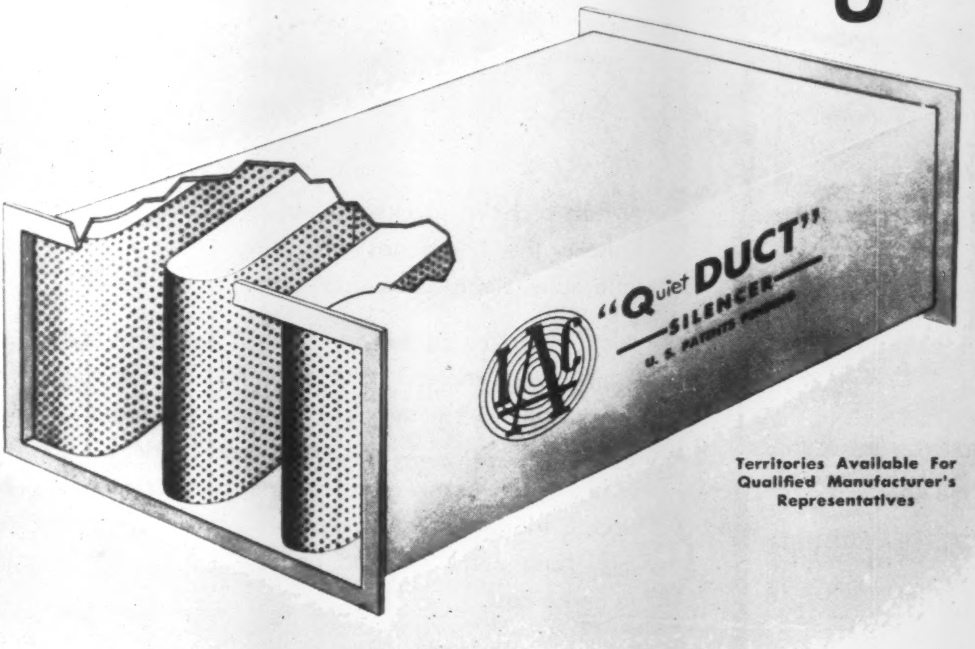
In the specification of materials or products that go into a building a commonly-used term is "or equal." Because of the principles behind Jenn-Air Quiet-Tested roof and wall exhausters, we like to believe there is *no equal* to Jenn-Air. The Jenn-Air creed demands: ***Jenn-Air FOLLOW THROUGH has no "or equal."***

Jenn-Air Quiet-Test Roof Exhauster, with U-Spring Cushion Suspension Mounting. Note low contour design.

JENN-AIR PRODUCTS COMPANY, INC.

1102 Stadium Drive • Indianapolis 7, Indiana

putting the SHH in air conditioning



Territories Available For Qualified Manufacturer's Representatives

GUARANTEED SILENCING AT ***LOWEST*** COST!

Easily installed "Quiet-DUCT" Silencers eliminate fan noises in the design stage — or in existing systems! Available in 148 standard sizes, "Quiet-DUCT" Silencers from 2 to 10 feet in length provide as much noise control as 30 to 200 feet of conventional lined duct.

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WILL FIT YOUR JOB!

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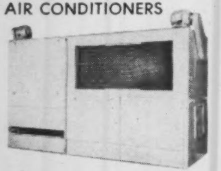
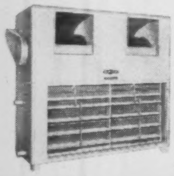
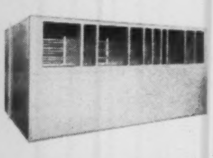


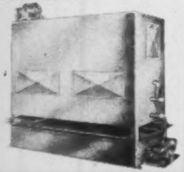
FAN & COIL UNITS



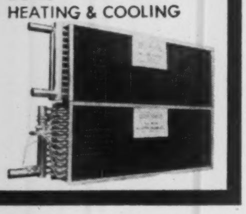
MULTI-ZONE
FAN & COIL UNITS



EVAPORATIVE
CONDENSER



COILS
HEATING & COOLING



When ordering packaged air conditioners, why should you inherit the headaches of fitting other manufacturers' unalterable "standard catalog" units to your needs?

Not when it's so easy to order "Satisfabricated" Governair units . . . completely self contained . . . completely flexible in design, to suit any particular load conditions or unusual space requirements. Governair "Satisfabricated" units operate with simple water, electrical and duct connections. Important, too, is the fact that Governair units are **engineered** better . . . and **built** better . . . to **operate** better, at minimum maintenance cost.

For more details, write the home office or refer to your classified directory for Governair's nearest representative.

GOVERNAIR CORPORATION
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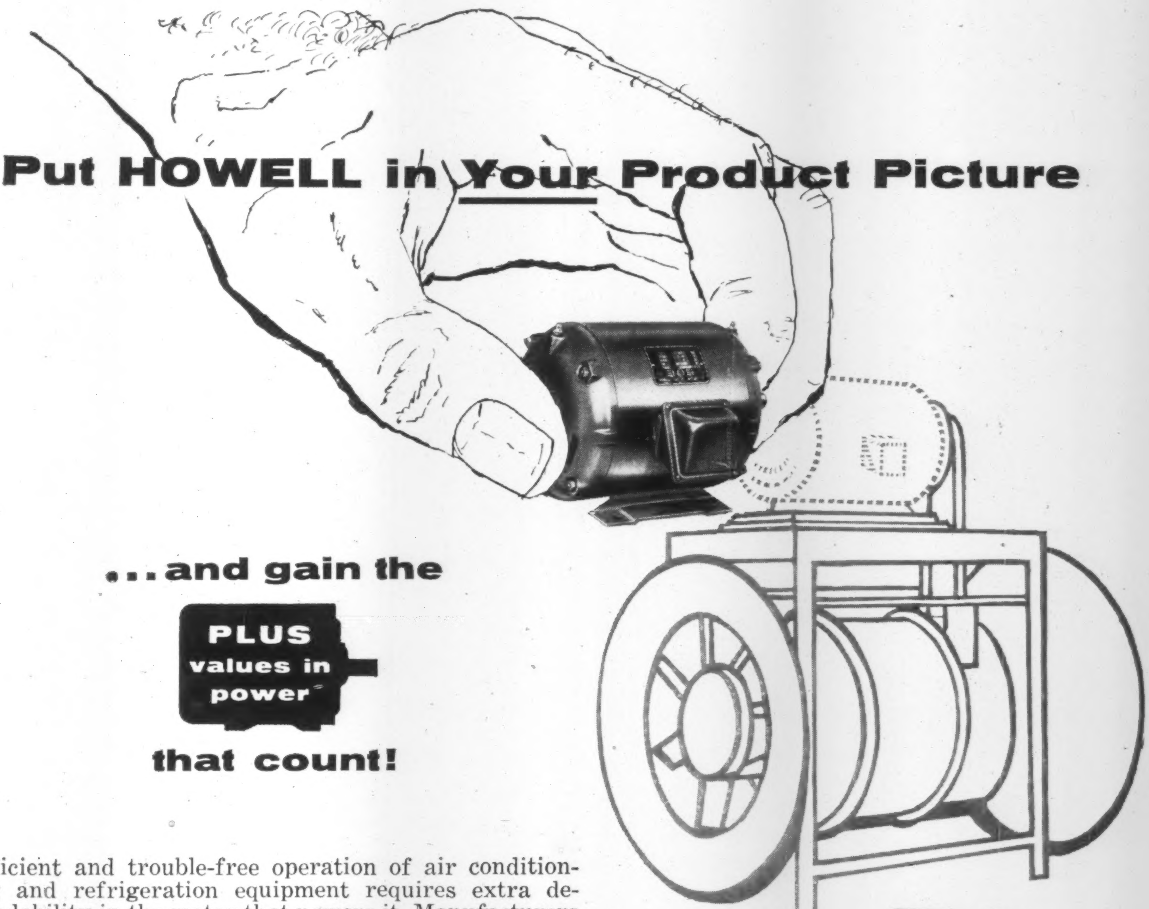
GOVERNAIR

Put HOWELL in Your Product Picture



. . . and gain the

PLUS values in power

that count!

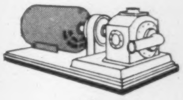
Efficient and trouble-free operation of air conditioning and refrigeration equipment requires extra dependability in the motor that powers it. Manufacturers and users throughout the industry recognize the plus values gained by specifying Howell motors, 1/8 thru 300 hp. Here are a few of these values:

Steel Feet and Frames Won't Crack Under Stress Unlike cast iron, Howell's steel feet won't crack when mounting bolts are tightened excessively. Howell's cold-rolled steel frames can take installation punishment. Cast iron end-plates assure constant shaft and bearing alignment.

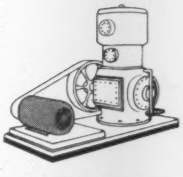
Cool-Running, Long-Lasting Efficiency New stator design with wide slots provides 50% more contact between cooling air and stator laminations. Combined with heat-dissipating copper rotors, this gives you a motor with extra stamina to withstand intermittent overloading or unusually high operating temperatures.

Functional Streamlining Howell motors have no fins, ribs or unnecessary offsets to collect dust deposits. External dirt cannot reduce these motors' cool-running efficiency — their neat appearance is easier to maintain.

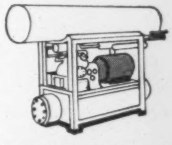
Wide Selection Howell makes virtually every type of AC industrial motor . . . fractional and integral to 300 hp, in all standard enclosures, in rerated and non-rerated frame sizes, and in many pump mountings. Howell part winding motors, for reduced voltage starting of compressors, pumps, etc., may be of special interest to you.



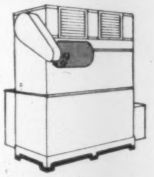
PUMPS



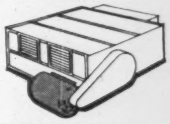
COMPRESSORS



PACKAGED CHILLERS



COOLING TOWERS



CENTRAL SYSTEM CONDITIONERS

Howell motors are used by these leading manufacturers of air conditioning equipment:

York Corp. ● Acme Industries ● Worthington Corp. ● Frick Corp. ● The Trane Co.

Binks Manufacturing Co. ● American Blower Corp.

A Howell sales engineer can give you valuable assistance on any motor application. Wire or 'phone collect . . . or drop us a line . . . you'll get prompt action. Howell Electric Motors Co., Howell, Michigan.

HOWELL Red Band MOTORS

HOWELL *motors*

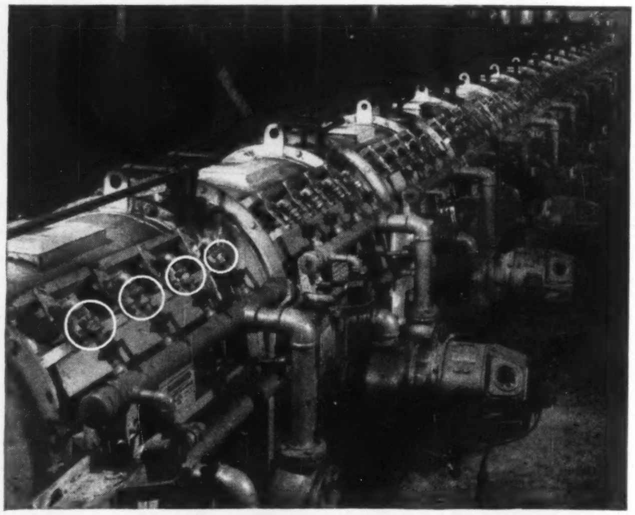
. . . precision built for industry since 1915

Tough jobs are a "cinch" for DRESSER Couplings

1

For Rapid Takedowns

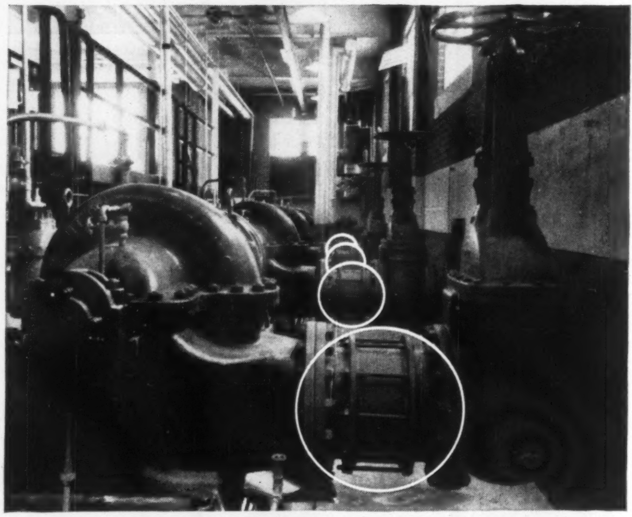
When piping on this huge industrial furnace manifold is removed for periodic cleaning of burners, down time is cut to a minimum. A few turns of a wrench disengages each of the over 100 Dresser Style 65 Couplings. They are easily reinstalled.



2

For Absorbing Vibration

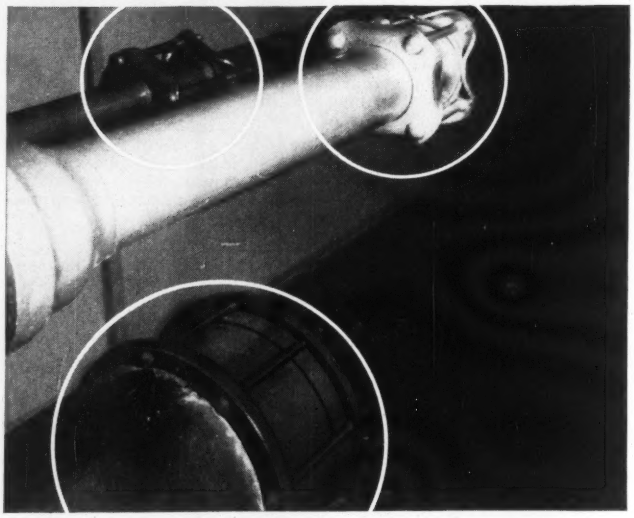
No matter how much these pumps vibrate, the Dresser Style 38 Couplings stay permanently tight. They're equipped with Dresser gaskets which absorb vibration, reduce noise. Style 38's are available for plain-end steel, cast iron or other pipe. Wrench-installed in but two man-minutes per bolt.



3

For Give-and-Take Flexing

At expansion joints in walls, anchored lines carrying liquids or gases must have joints that will *absorb* pipe movements. So Dresser Style 38 Couplings are used. They have resilient rubber gaskets that absorb expansion-contraction, yet stay bottle-tight and maintenance-free.



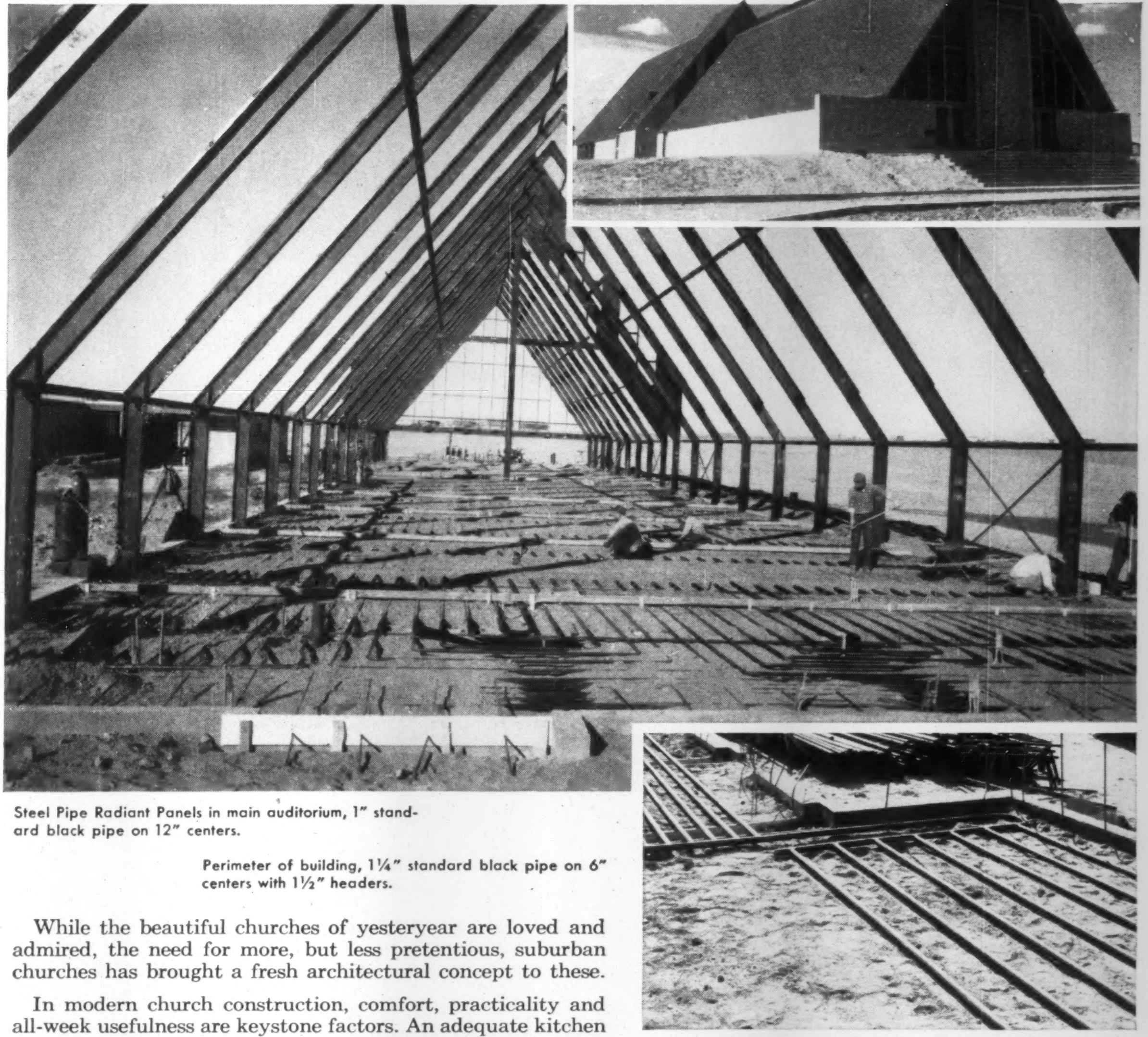
For fast, easy, sure pipe joining, see your local piping supplier for Dresser Couplings, Ells, Tees, Adapters, etc.

DRESSER®

Dresser Manufacturing Division
79 Fisher Ave., Bradford, Pennsylvania
In Canada: Toronto and Calgary.

ONE OF THE DRESSER INDUSTRIES

Another modern church chooses Steel Pipe Radiant Heating



Steel Pipe Radiant Panels in main auditorium, 1" standard black pipe on 12" centers.

Perimeter of building, 1¼" standard black pipe on 6" centers with 1½" headers.

While the beautiful churches of yesteryear are loved and admired, the need for more, but less pretentious, suburban churches has brought a fresh architectural concept to these.

In modern church construction, comfort, practicality and all-week usefulness are keystone factors. An adequate kitchen may rank with auditorium acoustics in importance. Certainly steel pipe radiant panel heating and sidewalk snow melting are part of today's suburban church planning.

In this Pueblo, Colorado, Christ the King Catholic Church, as in many others, a steel pipe radiant panel heating system will provide perfect, draft-free comfort for 9120 square feet of floor area.

Yes, steel pipe is first choice for radiant heating . . . as it is for snow melting, plumbing, fire protection systems, electrical conduit, gas, steam and air transmission lines, and structural pipe applications. Steel pipe gives the ultimate in service for every dollar spent!

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Steel Pipe
is First Choice

Write for the free 48 page color booklet "Radiant Panel Heating with Steel Pipe"

Only Steel Pipe gives all these advantages!

- Low cost with durability
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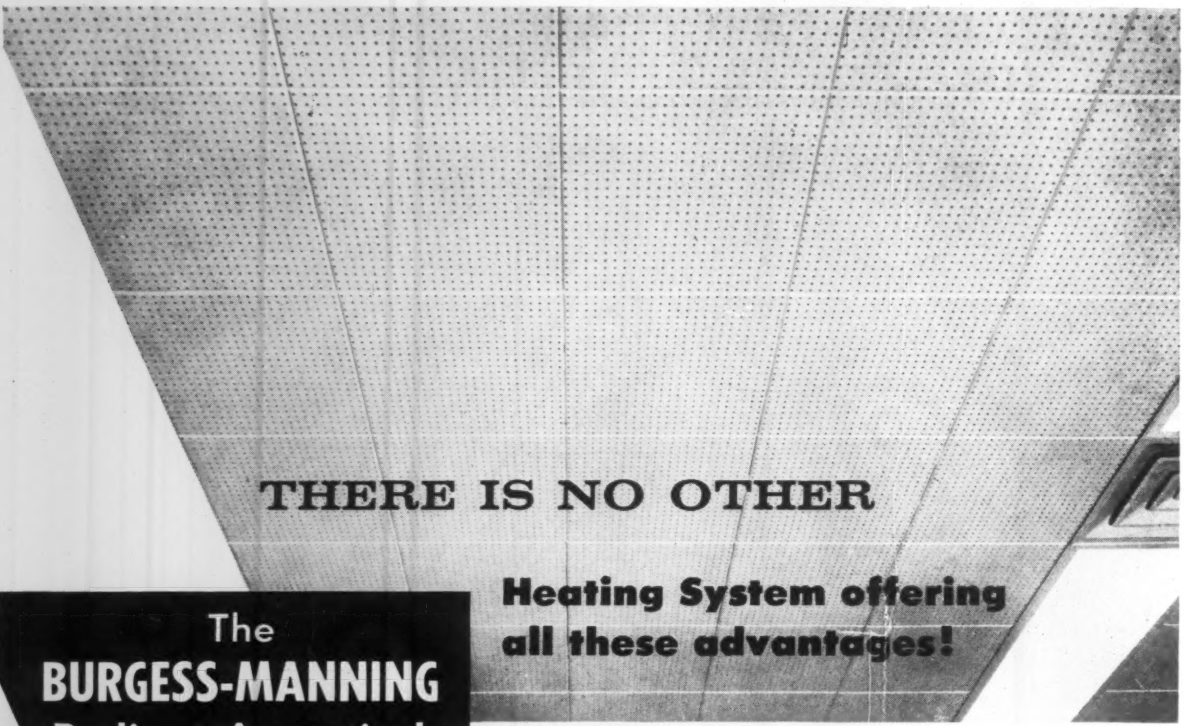
- Available everywhere from stock



THERE IS NO OTHER

Heating System offering all these advantages!

The BURGESS-MANNING Radiant Acoustical Ceiling

The Only Completely Integrated Radiant Heating, Cooling and Acoustical Ceiling

The Burgess-Manning Radiant Acoustical Ceiling has been thoroly proved in many schools, hospitals and other institutional and commercial buildings all over the country. No other heating system offers so many advantages, not only in body comfort, but in efficiency and economy!

Because this ceiling heats by radiant energy exclusively, and does not depend on air currents, room temperatures are more uniform with no drafts. Response to temperature controls is instantaneous with practically no lag or over-run. Floor temperatures are always higher than room temperature.

The Burgess-Manning Radiant Acoustical Ceiling utilizes less valuable building space than conventional heating systems — with no radiators to occupy usable floor space. It offers maximum freedom of architectural design. Add to this, the highest noise absorbing capacity available today for complete acoustical control!

With direct metal-to-metal contact between coils and radiant panels, heating and cooling are accomplished with a minimum input of energy or fuel consumption. With fewer mechanical parts, maintenance, too, is cut down.

No other heating system offers so many advantages—in comfort, in efficiency, in economy.

Remember—

Your Building Is Better
Your Building Budget No Bigger

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IN SWEET'S
ARCHITECTURAL
FILE
OR WRITE FOR COPY

Write for Descriptive Burgess-Manning Catalog No. 138-2H

3 Heating Cooling Acoustical

BURGESS-MANNING COMPANY
Architectural Products Division
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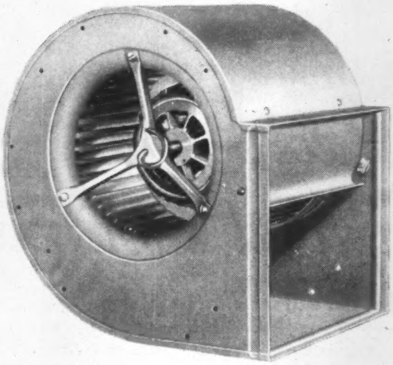
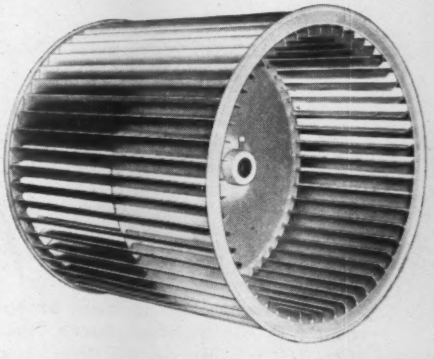
with these products of Lau Engineering Leadership on view at the 10th EXPOSITION, A.R.I.

BOOTH 543

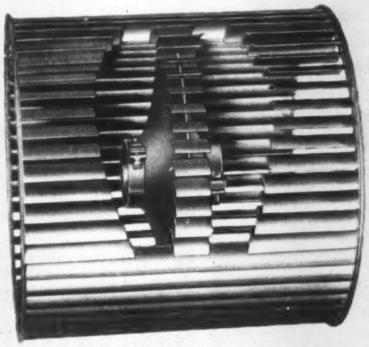
LAU New product developments that are keeping Lau ahead of industry requirements . . . late news on finishes . . . forecasts of things to come from our Engineering Department: *You will certainly want to hear the latest news from Lau!* See us at Booth 543, Air-Conditioning and Refrigeration Industry, International Amphitheatre, Chicago, November 18-21.



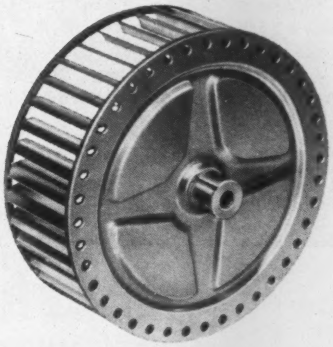
Electro-Wheel® Blower The Lau exclusive, patented unit that delivers more air with less power load than ever before! See its advantages for yourself.



Preslok® Wheel. New, 18″ dia. addition to this famed Lau family of wheels will be on view. Speeds at least 50% over catalog ratings are now possible!



Large-Bore Wheel. Now! a wheel applicable to shafting 2″ to 4½″ diameter. Hub is extruded from center discs for minimum weight.



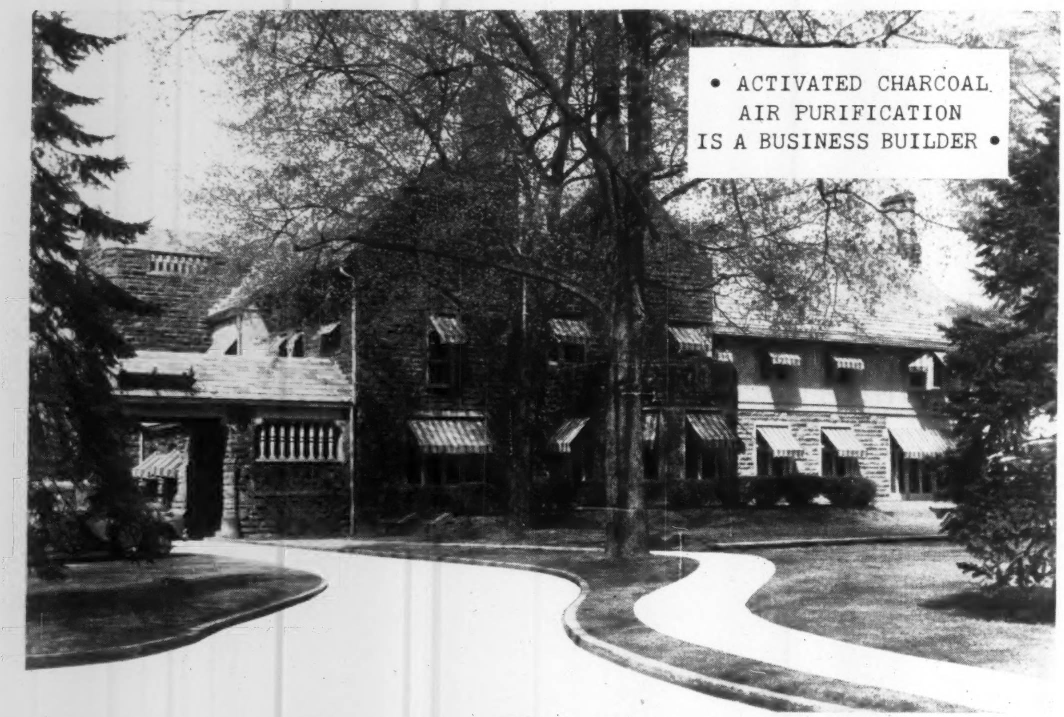
Small Weld Wheels Improvements in Lau 4″ to 9″ wheels, made possible by continuing field work, will be an interesting feature of our exhibit.

LAU®

THE LAU BLOWER COMPANY

In Canada: The Lau Blower Co. of Canada, Ltd., Kitchener, Ont.

2027 Home Ave.
Dayton, Ohio
Azusa, Calif.



Famous Granville Inn's Recipe for Patron Comfort: Activated Charcoal

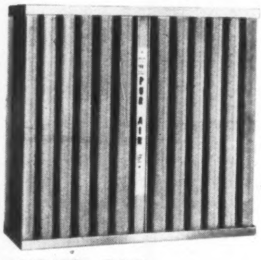
Even though it is one of the midwest's finest eating places, the Granville (Ohio) Inn found the usual cigarette smoke and odor control problem affecting patron comfort. Installation of *activated charcoal* FilterFolds in the duct work solved the problem. The charcoal air purifiers operate in conjunction with an electrostatic precipitator and handle 8250 cfm. The result: A continual supply of fresh, clean air—winter and summer—upholding the Inn's reputation for finest accommodations.

Include *activated charcoal* air purification in your next job—cooling or heating. Barnebey-Cheney has a complete line of *activated charcoal* air purifiers for any size or type installation, from smallest window unit to largest central system. Forced air heating needs *activated charcoal* air purification, too. Odor control is a year-around necessity. With *activated charcoal* purifiers performing the function of outside air for ventilating, 30% savings in cost can be realized.

BARNEBEY-CHENEY

CASSADY at EIGHTH **COLUMBUS 19, OHIO**

Barnebey-Cheney HPAC11
Cassady at Eighth
Columbus 19, Ohio
Please send free technical bulletins on applying activated charcoal air purification.
Name ....
Firm ....
Address ....
City .... State ....



WRITE FOR technical literature on how to apply activated charcoal air purification.

NOW! A NEW STANDARD FOR THE HANDLING OF AIR . . .

FOR

1 Building Ventilation

2 General Supply and Exhaust

3 Conventional and High Pressure Air Conditioning

4 Vehicular Tunnel Ventilation

5 Industrial Processing

6 Combustion Air Supply

Series 8000

NEW AIRFOIL CENTRIFUGAL FANS!

. . . the new standard in a complete line

FULL RANGE APPLICATION

GENERAL PURPOSE

Classes I and II

Up to 6¾" Total Pressure

HEAVY DUTY

Classes III and IV

Up to 16¾" Total Pressure

Up to 700,000 CFM

Westinghouse Airfoil Blading has proved its effectiveness in six years of operation by two hundred customers in Mechanical Draft, Industrial Process, and High Pressure Air Conditioning.

Westinghouse now obsoletes conventional flat blading and brings you the efficiency and quietness of Airfoil Blading for ALL PURPOSE applications in a complete standard line of Centrifugal Fans, covering every requirement up to 700,000 CFM . . . Up to 16¾" total pressure.

J-80640

WESTINGHOUSE AIRFOIL CENTRIFUGAL FANS NOW GIVE YOU . .

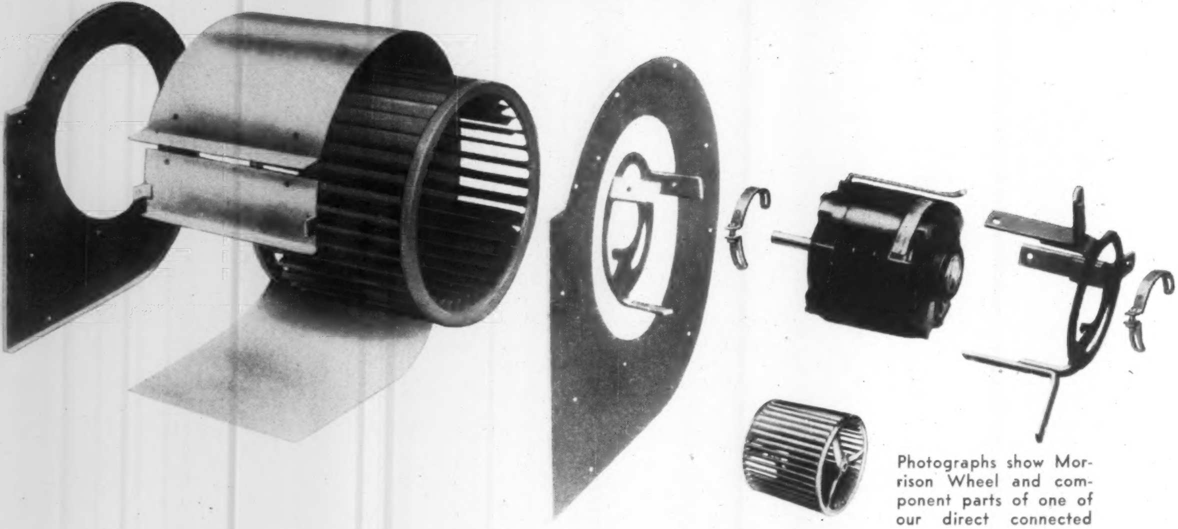
- ★ **LOWEST OPERATING COSTS . . .** High Efficiency — Low Horsepower!
- ★ **QUIET OPERATION . . .** Airfoil Blading — Streamlined Air Flow!
- ★ **CAPACITY PROTECTION . . .** Steep Pressure Curve — Minimum Capacity Variation!
- ★ **NON-OVERLOADING POWER FEATURE!** Full Load at Motor Rating—No Overload!
- ★ **AMCA (NAFM) STANDARD SIZES!**

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE... IF IT'S Westinghouse

MORRISON CUSTOM DESIGN

MCD



Photographs show Morrison Wheel and component parts of one of our direct connected blowers.

Engineered and customized for your particular need!

COMPLETE OR ANY PART . . .

MCD* combines the various Morrison Blower Designs with the many component parts that go into the making of complete assemblies. Morrison Products' nationally recognized engineering superiority offers you customized blowers engineered for your particular furnace and air conditioning units.

MCD* gives you quality produced blowers — meets every space and function requirement — overcomes all the limitations of stock blowers — assures substantial savings with its volume produced standard parts.

When you choose MCD*, you automatically invite Morrison's skilled engineering staff in the solution of your specific problems. Our experts have already helped most of the leading heating and air conditioning manufacturers attain ideal air distribution in their equipment.

Write Morrison today. Learn how MCD* can help solve your engineering and production problems.

MORRISON PRODUCTS INC.

16816 Waterloo Road — Cleveland 10, Ohio

An Important Announcement

TO ASSURE YOU THAT AIR MOVING EQUIPMENT...

...will perform according to its published ratings

An international program is under way by AMCA. It will provide you as rapidly as possible with a means of identifying those types of air moving equipment qualifying under the program.

As a protection to you, practically all leading manufacturers of air moving equipment are planning to qualify their standard products in tests made in accordance with the AMCA Standard Test Code and in laboratories inspected and approved by AMCA.

Each qualifying company will operate under a license agreement with AMCA basically requiring the following:

1. **The manufacturer's laboratory must be approved by AMCA.**
2. **Qualifying equipment must be tested in accordance with the AMCA Standard Test Code and published ratings must be in accordance with such tests.**
3. **The manufacturer must maintain manufacturing control of the products involved so that the equipment will perform in accordance with published ratings.**

For more details fill in and mail the coupon below.

AMCA
AIR MOVING & CONDITIONING ASSOCIATION INC.

AIR MOVING & CONDITIONING ASSOCIATION, INC.

CUT OUT AND MAIL

AIR MOVING & CONDITIONING ASSOCIATION, INC.
2159 Guardian Bldg.
Detroit 26, Mich.

Please let me have details on the AMCA Program for rating of air moving equipment.

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COMPANY____________________

ADDRESS____________________

CITY & STATE____________________

LITHO. IN U.S.A.

DOES A
HONEYBEE
HAVE AN
ANSWER TO
CANCER?

DRONE.
QUEEN.
WORKER.

Mouse and man, worm and wasp, pig and protozoa—these are some of the twenty-eight living things used in the American Cancer Society's nation-wide research program.

Scientists rely most—in 189 projects—on man; next comes the mouse—in 139 studies—and there is even a honeybee helping one scientist in his search for facts that may save the quarter of a million Americans now dying each year of cancer.

Many organisms. Many laboratories. Many hundreds of scientists. Together they make up a balanced program of research with freedom and flexibility, reaching across the country and across scientific disciplines, to tap the best minds and the best ideas.

From these twenty-eight organisms science is getting facts that may save more lives tomorrow. But what of today? What of you?

With early diagnosis, half of those with cancer can now be cured if treated promptly. If you have cancer, you may well be saved—but only if you give your doctor a chance. Go to him for an annual health checkup . . . not because you feel ill, but because you feel good and want to stay that way.

The worm and the wasp, the pig and the protozoa will provide the answers for tomorrow: for today, see your family doctor.

AMERICAN
CANCER
SOCIETY

EXTRA **IMPORTANT NEWS** **EXTRA**

FOR AIR CONDITIONER MANUFACTURERS

MOST OF THE NATION CAN LOOK FORWARD TO A HOT AND HUMID SUMMER

That's the long-range predic-
tion of the weather bure
Above-average tempe
will prevail through
east, northeast,
middle west,
southwest. On
the extreme nor
east will be
sweltering summ
in those are
will be above
Rainfal
average in
Frequent
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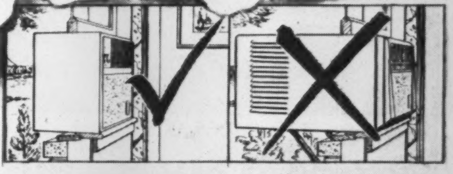
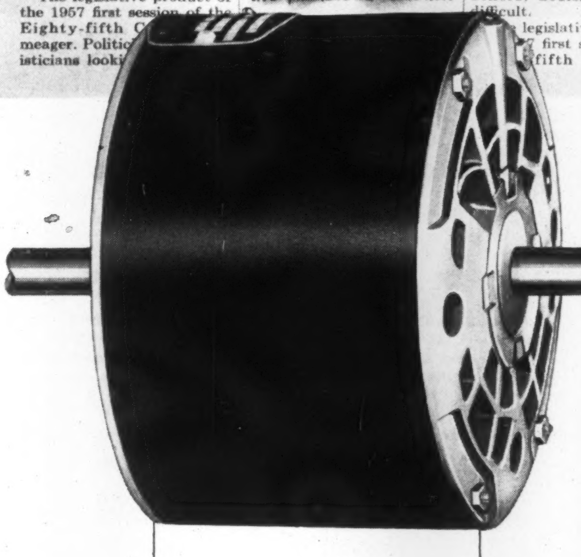
EMERSON-ELECTRIC
Shrinks Motor Depth
ONE FULL INCH
for Your New Thin Models





3⅛"

1/12 h.p. 4-pole motor

The Trend for '58

More compact . . . yet *without* loss of power! New Emerson-Electric shaded-pole motors have been reduced *one full inch* between the motor hubs. You will need these thinner motors in designing your new models!

Call, wire or write Dept. M-85 today for complete information, The Emerson Electric Mfg. Co., St. Louis 21, Mo.

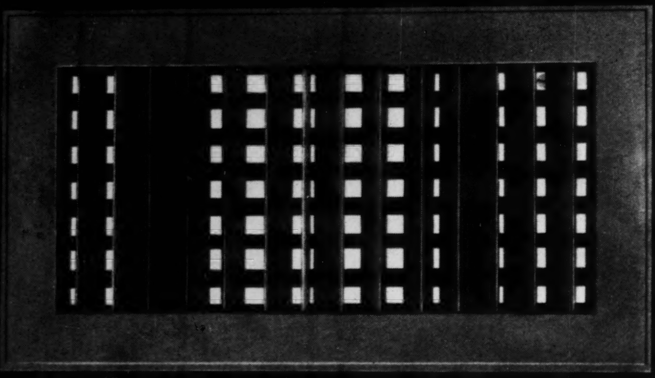
EMERSON-ELECTRIC of St. Louis

LIVE BETTER ELECTRICALLY Since 1890

See us at Booth 660-661, 10th Expo. A.C. & R. I., Chicago International Ampitheater, November 18-21

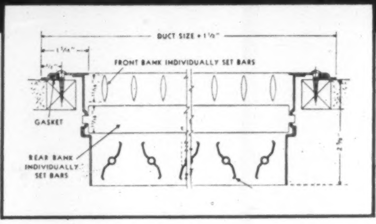
FAMOUS 190 MULTI-FLEX

The WORLD-APPROVED LINE of SILENT PERFORMANCE, GREATEST AIR-HANDLING POWER, and PERFECT AIR DISTRIBUTION For WARMING and COOLING AIR CONDITIONING



No. 190 U.S. MULTI-FLEX REGISTERS

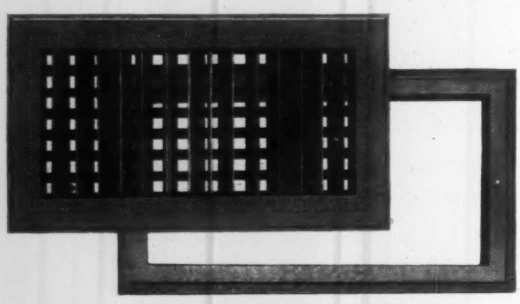
DOUBLE BANKS of Double-Edged STREAM-LINED BARS give any Direction of UP-FLOW, DOWN-FLOW or LATERAL FLOW DESIRED. Use 190 MULTI-FLEX REGISTERS ANYWHERE in COMMERCIAL or RESIDENTIAL Applications — for PERFECT AIR HANDLING and Volume Control — for Complete Satisfaction and Efficiency and ORIGINAL COST ECONOMY.


DUCT SIZE + 1½"
1 7/16"
½"
FRONT BANK INDIVIDUALLY SET BARS
GASKET
REAR BANK INDIVIDUALLY SET BARS
2 ⅝

SCREWDRIVER OPERATED OPPOSED VALVES — ORIGINAL No. 190 Equipment

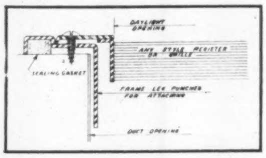
OPPOSED REAR VALVES — AN ORIGINAL PATENTED U. S. FEATURE — gives ACCURATE, INSTANT AIR VOLUME CONTROL. Special Valve Design plus STREAM-LINED GRILLE BARS give WHISPER QUIET AIR FLOW at ALL PRACTICAL VELOCITIES. Screwdriver setting means no LOOSE KEYS to LOSE. No. 190 has the MARK OF EXTRA QUALITY that puts all U. S. REGISTERS and GRILLES AHEAD of the FIELD.

SCREW DRIVER OPERATION EXCELS ALL OTHER METHODS OF VALVE CONTROL



No. 51 OUTSIDE FRAMES

May be furnished for ALL No. 190 and No. 200 SERIES. PERMIT Quick, LOW-COST INSTALLATION — Fast ATTACHMENT of Register and Grille to Frame — Likewise, Quick Detachment when Desired. No. 51 OUTSIDE FRAMES are complete with rubber gasket to PREVENT LEAKING and Wall "Smudging."

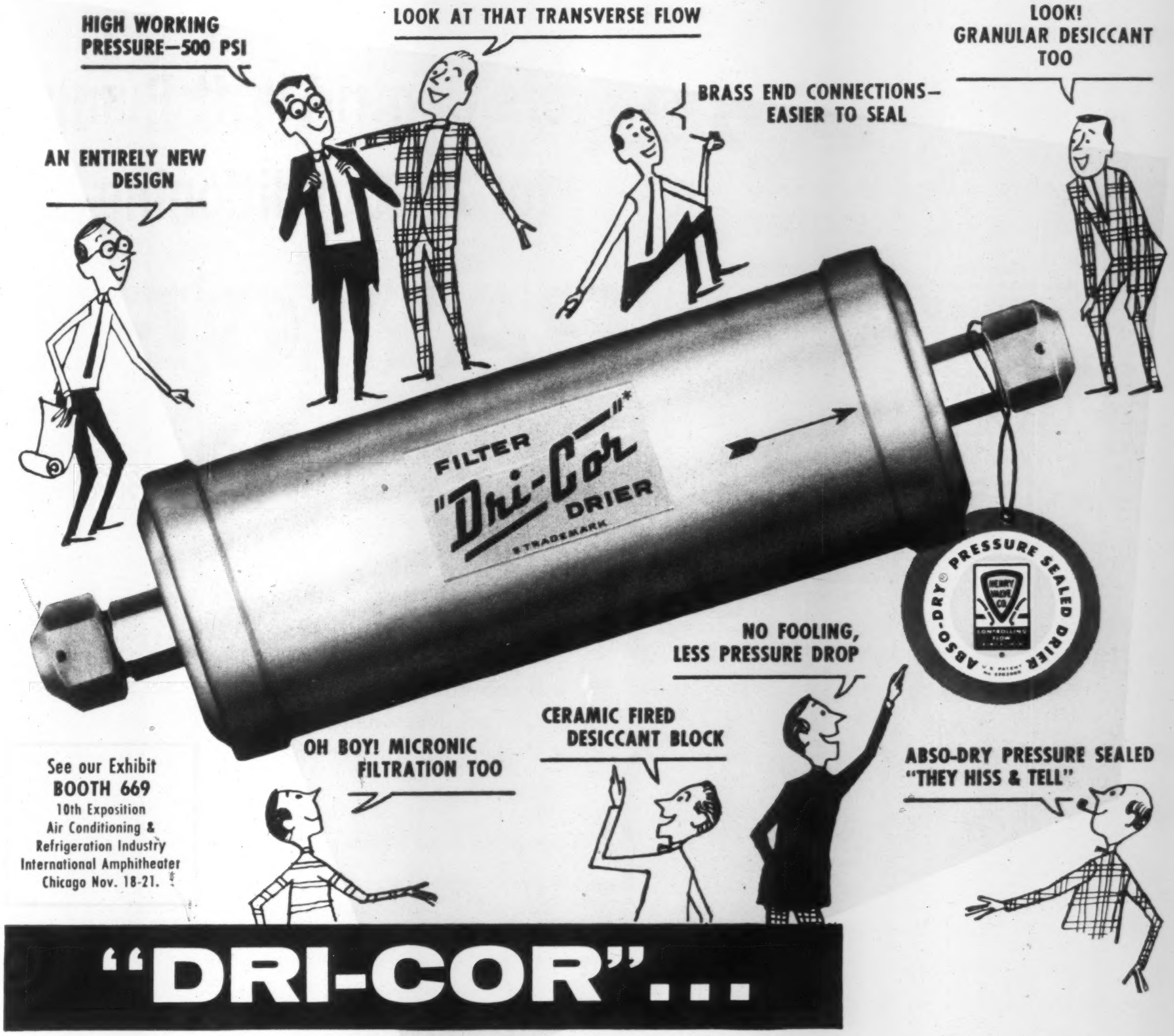

DAYLIGHT OPENING
ANY STYLE REGISTER OR GRILLE
SEALING GASKET
FRAME LEG PUNCHED FOR ATTACHING
DUCT OPENING

CROSS-SECTION No. 51 FRAME

WRITE FOR THE COMPLETE U. S. CATALOG No. 556-R

UNITED STATES REGISTER COMPANY

BATTLE CREEK, MICHIGAN
MINNEAPOLIS • KANSAS CITY • ALBANY


HIGH WORKING PRESSURE—500 PSI
LOOK AT THAT TRANSVERSE FLOW
LOOK! GRANULAR DESICCANT TOO
BRASS END CONNECTIONS—EASIER TO SEAL
AN ENTIRELY NEW DESIGN
FILTER "Dri-Cor"* DRIER
*TRADEMARK
ABSO-DRY® PRESSURE SEALED DRIER
HENRY VALVE CO.
CONTROLLING FLOW
NO FOOLING, LESS PRESSURE DROP
CERAMIC FIRED DESICCANT BLOCK
OH BOY! MICRONIC FILTRATION TOO
ABSO-DRY PRESSURE SEALED "THEY HISS & TELL"

See our Exhibit
BOOTH 669
10th Exposition
Air Conditioning &
Refrigeration Industry
International Amphitheater
Chicago Nov. 18-21.

"DRI-COR"...

a New Name—a Finer Filter-Drier

■ You can expect the best from Henry. Here's the new "Dri-Cor" Filter-Drier. It incorporates an activated ceramic desiccant block for micronic filtration in combination with granular desiccant for high efficiency drying with low pressure drop. Drying and filtering are properly proportioned.

Like other Henry Driers the "Dri-Cor" is thoroughly reactivated and pressure sealed at the factory, through the exclusive patented Henry Abso-Dry process.

This assures maximum drying efficiency at the time of installation. See this new type Filter-Drier at the show. It is definitely a "must" for those who demand the best.

HENRY VALVE CO.
MELROSE PARK, ILLINOIS (Chicago Suburb)
Cable: Hevalco, Melrose Park, Illinois
VALVES, DRIERS, STRAINERS, AND ACCESSORIES FOR REFRIGERATION, AIR CONDITIONING, AND INDUSTRIAL APPLICATIONS

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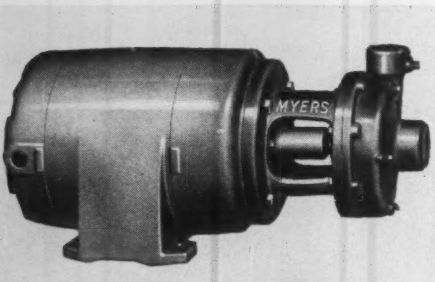
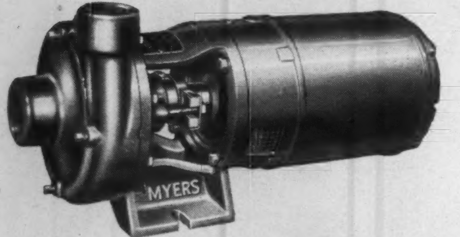
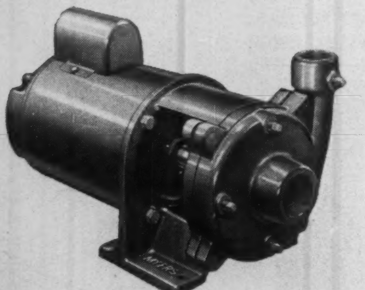
LISTED BY UNDERWRITERS' LABORATORIES, INC. UNDER RE-EXAMINATION SERVICE FOR MAXIMUM WORKING PRESSURE OF 500 PSI



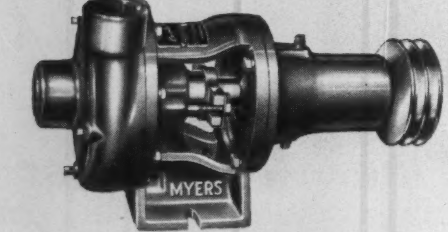
Model 150M Model 200M
Shown with rotary seal (available with stuffing box)



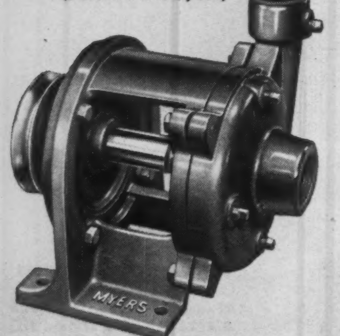
Model 125M Model 150M
Shown with stuffing box (available with rotary seal)



Model 100M—Rotary seal only



Model 125B Model 150B Model 200B
Shown with stuffing box
(available with rotary seal)



Model 100B—Rotary seal only

Myers Centri-Thrift Pumps for Air Conditioning

PAY OFF 3 WAYS

1 Longer Continuous Performance

- All-bronze impeller, accurately balanced for smooth operation.
- Removable bronze wearing ring, easily replaced.
- Corrosion resistant, stainless steel shaft.
- Backed with a warranty unsurpassed in the industry.

2 Complete Line to Meet Any Specification

- Full range of sizes: 1″ x 1¼″, 1¼″ x 1½″, 1½″ x 2″, 2″ x 2½″, threaded discharge and suction. ⅓, ½, ¾, 1, 1½, 2, 3, 5 and 7½ horsepower, motor-mounted or belt driven.
- Regularly fitted with high quality rotary ceramic-faced seal. Stuffing box may be specified on "125", "150" and "200" models.
- Choice of motors: single or three phase, single or dual voltage, open or enclosed.
- Competitively priced.

3 Field-proven Service

- Capacities to 240 gallons per minute. Heads to 140 feet.

WRITE TODAY FOR SECTION 210 ON MYERS CENTRI-THRIFT PUMPS

Myers® PUMPS

THE F. E. MYERS & BRO. CO. • ASHLAND, OHIO • KITCHENER, ONTARIO

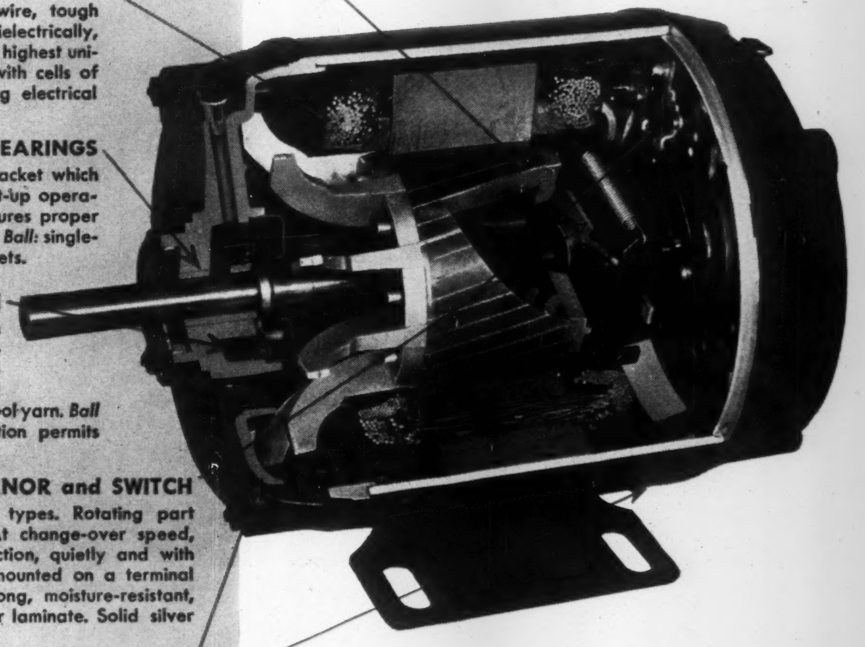
Myers®

NEW, COMPACT *Century* 48-FRAME

Fractional HP MOTORS

INDUSTRIAL QUALITY for all applications

take less space... weigh less... perform better!



ROTOR
Rotor bars, end rings, and fans integrally pressure-cast of virgin aluminum. Rotors dynamically balanced to very close limits; meet strict quiet-motor requirements.

INSULATION
Heavy vinyl acetal insulated wire, tough mechanically, thermally, and dielectrically, has excellent moisture resistance, highest uniformity. Stator core slots lined with cells of DuPont Mylar bonded to all-rag electrical paper.

BEARINGS
Sleeve: pressed into place in bracket which has been bored true in single set-up operation. Finish boring operation assures proper bearing surface and concentricity. *Ball:* single-shielded, precision fitted in brackets.

LUBRICATION
Sleeve bearing type: wool yarn wicking provides constant oil supply to oil groove. Inner sump cup retains excess oil which is tapped by felt wicks extending into the wool yarn. *Ball bearing type:* standard construction permits re-greasing.

GOVERNOR and SWITCH
For capacitor and split phase types. Rotating part securely press-fitted to shaft. At change-over speed, governor operates with snap action, quietly and with no flutter. Stationary switch is mounted on a terminal plate; plate is GLASTIC, a strong, moisture-resistant, arc-resistant glass-filled polyester laminate. Solid silver contacts are used.

BEARING BRACKETS
Pressure cast in special aluminum casting alloy. Stress relieved for permanent stability. Strong internal ribbing for strength, and smooth outside surface.

FRAME
Stator frame rings formed of one-piece heavy rolled steel. No frame openings; windings fully protected. Rabbet fit faced and bored true to provide proper alignment of bracket and a concentric air gap. Heavy formed steel feet welded to frame ring.

Century Industrial Quality means *design* that does not compromise dependability to gain slight cost advantages... sturdy construction provides the stamina which assures continuous operation. 48-Frame Motors now available from 1/20 to 1/3 HP... Performance-Rated to your needs... with weight savings up to one-third!

Test one of these motors for yourself. Call or write your nearby Century District Sales Office or Authorized Distributor. Send for new bulletin 1-1P1.

Performance-Rated© MOTORS
1/20 to 400 HP

CENTURY ELECTRIC COMPANY

1806 Pine Street • St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*

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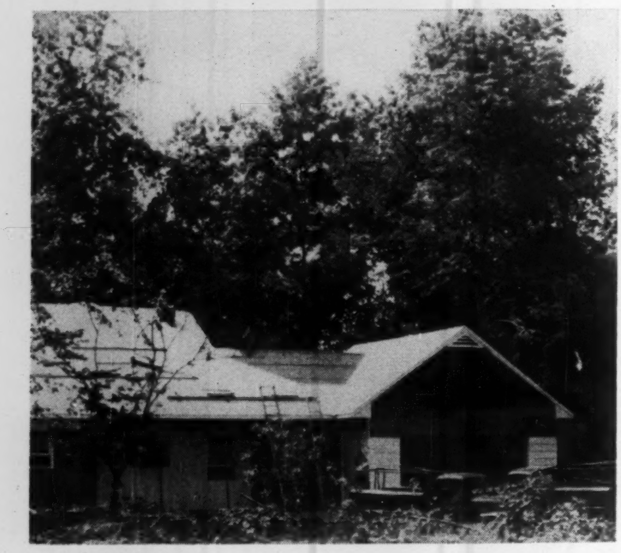
Purdue University Residence Hall H #1, Lafayette, Ind.



Modern Suburban Home

St. Francis Hospital, Beech Grove, Ind.

Indiana Joins the Nationwide Swing

It's Bridgeport—

For The Big Jobs

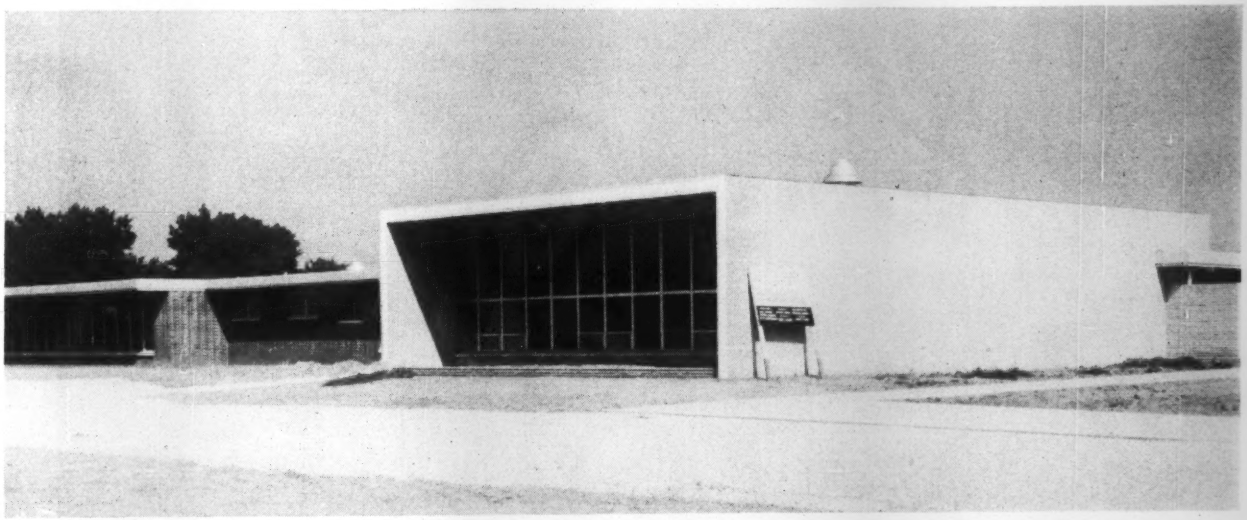
Everywhere you go in Indiana you see outstanding buildings like these equipped with Bridgeport Copper Water and Drainage Tube. In fact in every one of the 48 states plumbing contractors are turning to Bridgeport's proven quality and ability to make good jobs better.

Whatever the installation – office buildings, hospitals,

BRIDGEPORT COPPER WATER

Stocked in conveniently located warehouses from coast to coast –

Sales Offices in Principal Cities – In Canada:



Wayne Township School #6, Marion County, Ind.

Indiana Building, Indianapolis Ind.

Purdue University Residence Hall H #1, Lafayette, Ind.

General Contractor—
J. L. Simmons Co. Inc., Indianapolis, Ind.

Architect—
Walter Scholer & Assocs., Lafayette, Ind.

Plumbing Contractor—
Freyn Brothers, Indianapolis, Ind.

Plumbing Jobber—
Barry Company, Indianapolis, Ind.

Wayne Township School #6, Marion County, Ind.

General Contractor—
George P. MacDougall Co., Indianapolis, Ind.

Architect—
Everett I. Brown Co., Indianapolis, Ind.

Plumbing Contractor—
T. W. Woelfing Co., Indianapolis, Ind.

Plumbing Jobber—
Plumbers Supply Co., Indianapolis, Ind.

Modern Suburban Home. Bridgeport Copper Water Tube and Drainage Tube are used throughout to insure a lifetime of trouble-free service.

St. Francis Hospital, Beech Grove, Ind.

General Contrator—
J. L. Simmons Co., Inc., Indianapolis, Ind.

Architect—
D. A. Bohlen & Sons, Indianapolis, Ind.

Consulting Engineer—
Ammerman, Davis & Stout, Indianapolis, Ind.

Plumbing Contractor—
Cook Brothers, Indianapolis, Ind.

Plumbing Jobber—
Central Supply Co., Indianapolis, Ind.

Indiana Building, Indianapolis, Ind.

General Contractor—
Wm. P. Jungclaus Co., Indianapolis, Ind.

Architect—
D. A. Bohlen & Sons, Indianapolis, Ind.

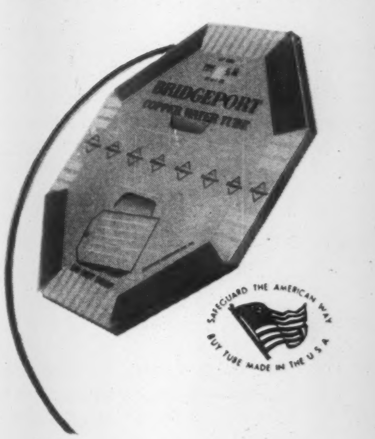
Consulting Engineer—
Devington, Taggart & Fowler, Indianapolis, Ind.

Plumbing Contractor—
Freyn Brothers, Indianapolis, Ind.

Plumbing Jobber—
Barry Company, Indianapolis, Ind.

to Bridgeport Copper Water Tube

schools, civic buildings, or private homes – it will pay you to specify Bridgeport for your copper water and drainage tube requirements. Bridgeport's nationwide network of wholesalers backed by Bridgeport's own strategically placed warehouses – insures prompt, efficient service on all your needs, large or small.



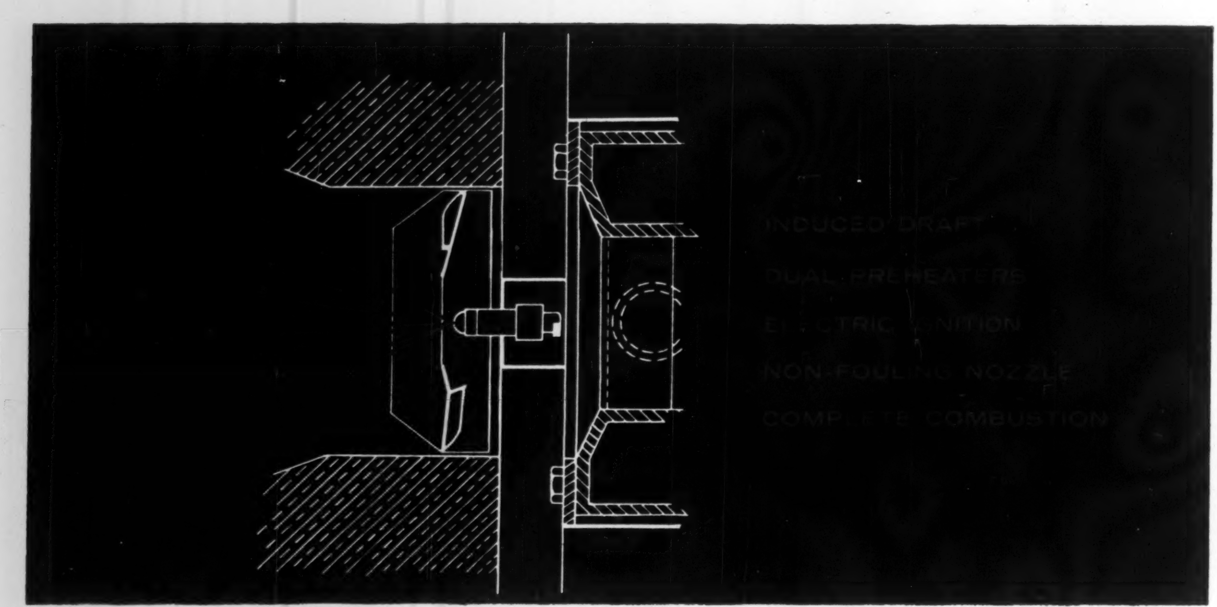
SAFEGUARD THE AMERICAN WAY
BUY TUBE MADE IN THE U.S.A.

AND DRAINAGE TUBE

BRASS
Bridgeport
CO.

Bridgeport Brass Company, Bridgeport 2, Connecticut

Noranda Copper and Brass Limited, Montreal



NEW PYROJET BURNS NO. 5 OIL WITH GUARANTEED EFFICIENCY

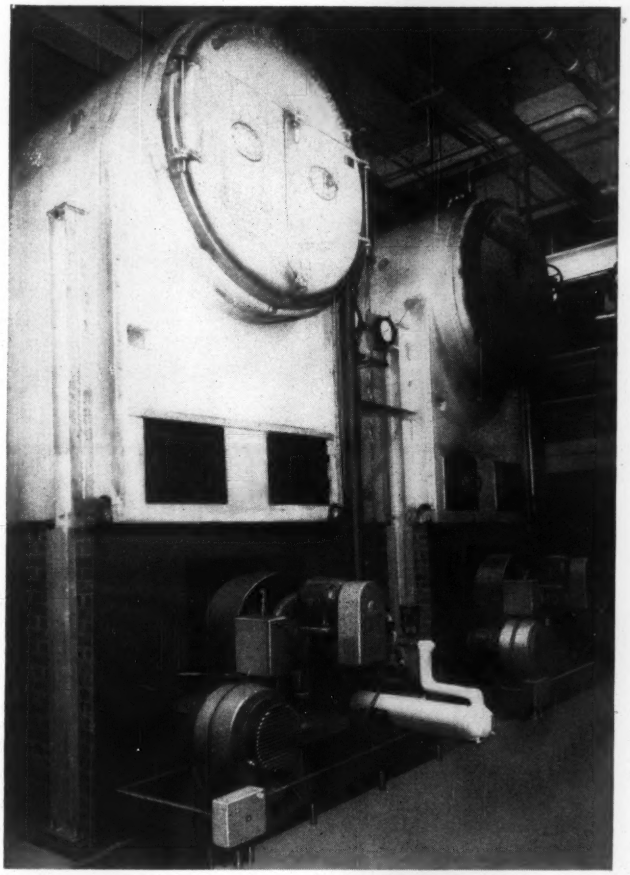
If your facilities are designed for No. 5 oil, Dravo's new *Counterflo* Space Heater with PYROJET burner will handle all grades of No. 5 oil efficiently and dependably. The dual pre-heating system brings hot oil out to the tip of the nozzle. Simplified electric ignition system provides smooth, dependable starts. With burner efficiency guaranteed for all grades of No. 5, a new level of heating economy is available.

Dravo Space Heaters with induced draft PYROJET burner are also available in gas or gas/light oil burning models. New stainless steel air-foil combustion chamber raises heat transfer efficiency. Ask your Dravo representative for expert advice on your heating problem, or write Dravo Corporation, Dravo Building, Pittsburgh 22, Pa.

DRAVO
CORPORATION

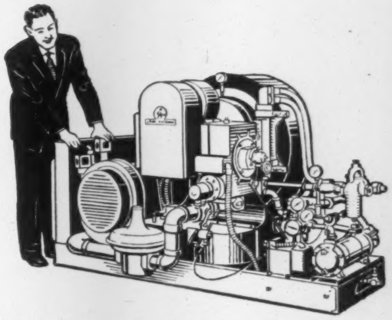
GET ALL THE FACTS ON LOW COST HEATING—WRITE FOR BULLETIN 564 . . .

Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation



Iron Fireman packaged oil firing units applied to firebox boilers. These units are suitable for nearly all types of steam or hot water boilers. The heating plant shown above is in the office building of the Celanese Corporation of America, Charlotte, N. C.

A complete firing system by Iron Fireman



Engineered as a unit . . .
installed as a unit

For oil, gas or oil-gas combination

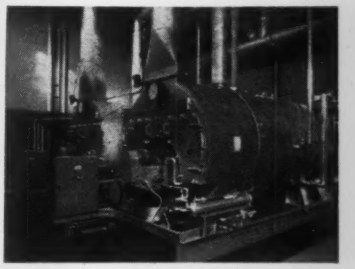
Here is a *factory engineered* firing system. Everything needed for balanced firing is mounted on a rigid steel base, ready to bolt to the boiler front. Nothing is left to the uncertainties of local assembly. For example, the critical refractory firing throat is pre-cast and installed at the factory, rather than being molded on the job. It is critical because proper design and accurate placement of the refractory tile increases combustion efficiency. It is scientifically designed to introduce secondary air around the burner head, avoiding the elaborate firebox brickwork in the typical conversion job.

Accurate control of all firing functions Every factor that affects firing efficiency is engineered into the unit at the factory. The unit includes: (1) Single or dual-fuel burner, with complete fuel handling systems. (2) Forced draft air supply. (3) Enclosed control panel, with instruments mounted, factory wired and tested, and with signal lights and dials that afford a complete reading at a glance.

In the oil-gas units, fuels can be switched automatically, or with the simple flick of a switch. Fires any fuel gas or any commercial grade of fuel oil available, including No. 6, without changing burner adjustment.

Local service. Hundreds of dependable Iron Fireman dealers are located in all parts of the United States and Canada. Their factory trained personnel are ready to furnish quick service to your burner, should the need arise. In addition, factory engineers are available in most areas to help you and your consulting engineer in planning boiler room modernization or construction.

For further information, mail coupon.



With matched Scotch type boiler

America's top boiler manufacturers join with Iron Fireman to produce boiler-burner units in which the boiler and firing system are engineered as a single integrated unit. Hundreds of these installations are in use in all parts of the world, with outstanding performance records. The boiler room, shown above, equipped with Iron Fireman-Kewanee units, is in one of the Detroit plants of the Briggs Manufacturing Company.

IRON FIREMAN MANUFACTURING CO.
3370 W. 106th Street, Cleveland 11, Ohio
(In Canada, 80 Ward Street, Toronto, Ont.)

Please send information on Iron Fireman forced draft firing for oil, gas, or oil-gas combination.

Name____________________

Firm____________________

Address____________________

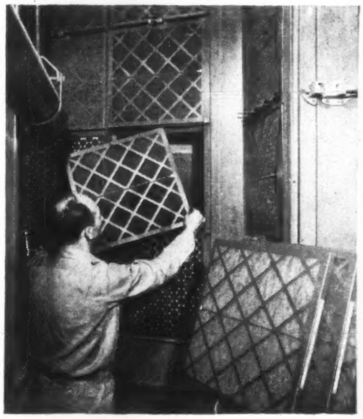
City________________ State__________

Iron Fireman®

AUTOMATIC FIRING EQUIPMENT FOR OIL, GAS, COAL

THE IRON FIREMAN ®

NEW!
SAFE!



New Glasfloss *Safety-Grille* Filters have been thoroughly tested in industrial and commercial installations. Users report complete satisfaction in all types of high-velocity, high moisture-content and extra-dirty applications. These new filters eliminate danger of cut hands and wrists from sharp or broken metal grilles. New chipboard grille is stronger, resilient when bent, provides effective filtering in all types of installations.

Glasfloss* fiber glass Safety-Grille* filter

TRADE MARK

stronger . . . tested in service . . . UL approved

Now, Glasfloss Fiber Glass Filters have a new design. The old-type metal grille has been replaced completely by a new chipboard grille, providing you with a filter that is safer to handle, stronger in design, and highly efficient.

CHECK THESE FEATURES—

1. **SAFER**—New Glasfloss chipboard grille eliminates danger to maintenance personnel of cut hands or infections caused by sharp or broken edges of metal grilles.
2. **STRONGER**—Chipboard grille and frame are one die-cut section; Glasfloss engineered-type construction gives added strength. This means less chance of filter damage in transit, in storage, in handling.
3. **EASIER DISPOSAL**—Used Glasfloss *Safety-Grille* Filters can now be rolled up for quick, simple trash disposal. No more stiff metal grilles!
4. **EFFICIENT**—Available filtering area and initial pressure drop of new Glasfloss *Safety-Grille* Filters are the same as old-type metal grille filters.
5. **TESTED IN SERVICE**—Glasfloss *Safety-Grille* Filters have been tested and proved in service in a variety of industrial and commercial applications.
6. **APPROVED**—Glasfloss Fiber Glass *Safety-Grille* Filters have been approved by Underwriters' Laboratories, Inc.

Don't wait! Test these new filters in your own plant or building now! Get top filtering results—and all these extra features—with Glasfloss. The new Glasfloss Fiber Glass *Safety-Grille* Filters are now available in a complete range of sizes from your local distributor or your nearby PPG Warehouse.

A PRODUCT OF PITTSBURGH PLATE GLASS COMPANY

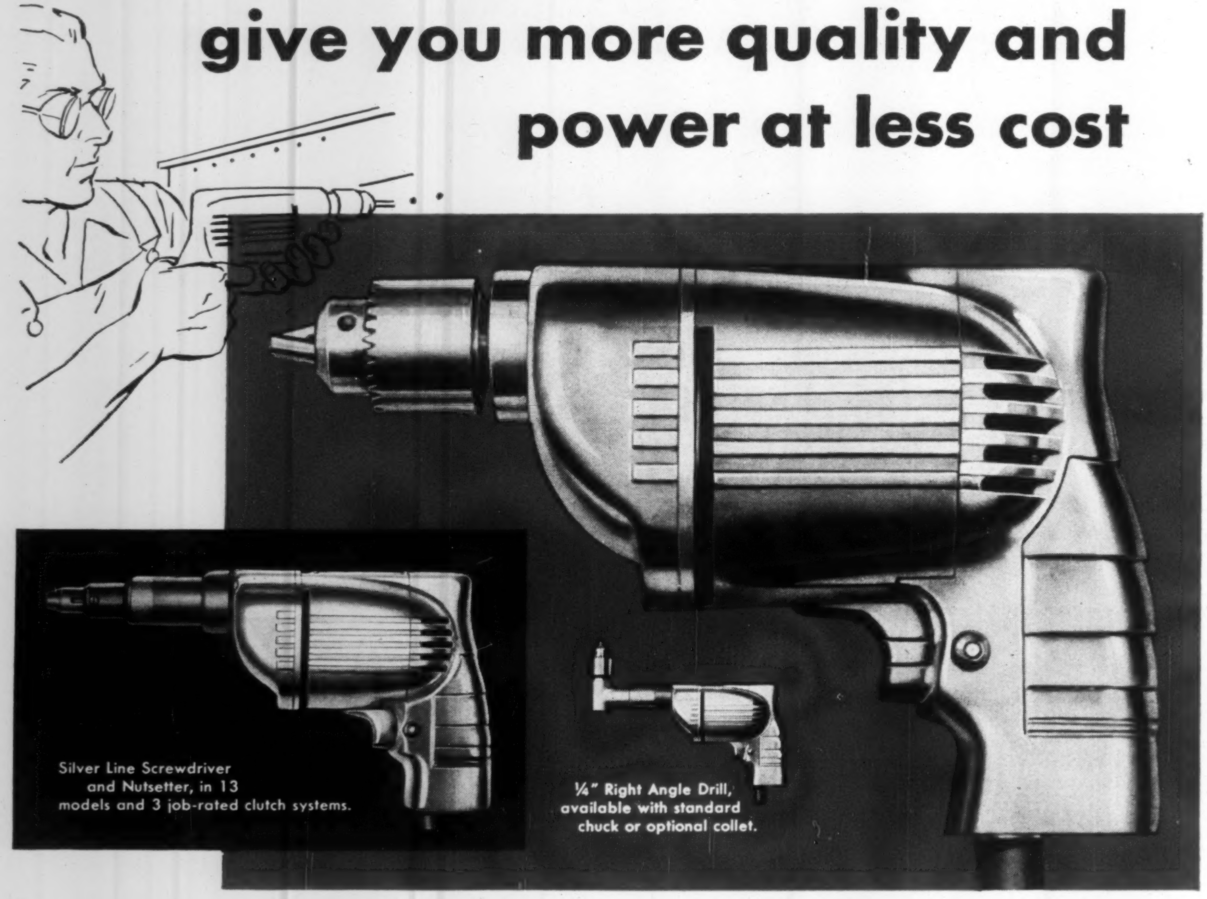
Sales offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PPG GLASS

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

There is good reason why
Thor electric drills
give you more quality and power at less cost



Silver Line Screwdriver and Nutsetter, in 13 models and 3 job-rated clutch systems.

¼″ Right Angle Drill, available with standard chuck or optional collet.

IN the interest of production efficiency, Thor engineers long ago learned that interchangeability of basic power tool parts cuts end-of-line costs. This saving permits Thor to build more quality into each tool and its attachments. Now, a basic tool can have attachments that provide industry with 400 different job-rated tools . . ., each one answering your need for quality, power and lowest maintenance cost.

One such electric tool is the Silver Line ¼″ Drill. Here is an example of *more* power: 25% more than other standard drills. Here is an example of *quality:* heavy-duty ball bearings throughout, bridged support for heavy-duty Thor-built armature bearing maintains alignment for positive accuracy and long wear.

Available in seven speeds to fit the specific drilling job. This Thor Silver Line ¼″ Drill is a perfect one-hand tool, especially for close-quarter and overhead work.

Get complete information and a demonstration from your Thor electric tool distributor. Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

THOR POWER TOOL COMPANY • CHICAGO, ILL.

Thor
PORTABLE POWER
TOOLS

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St. Louis • San Francisco
Seattle • Toronto, Canada
Export Division, New York City

THEY SMASHED INTO THAT WEIRKOTE® TILL WE COULDN'T STAND IT!

When a half-ton steel wrecking ball smashes broadside on target—mister, that's a *test*.

Yet, when Weirkote zinc-coated steel is put through that, or equally brutal punishment, its zinc coating stays skin-tight throughout the ordeal.

Think of that demonstration in terms of *your* products, production steps and cost problems.

Weirkote's continuous-process zinc coating *thrives* on toughest fabrication steps—spinning, deep drawing, roll forming, extrusion. And there's no flaking or peeling.

With Weirkote, you can eliminate the cost of plating, painting or redipping after fabrication. In many instances, you'll get prolonged die life, too, due to the lubricating quality of Weirkote's zinc coating.

Free Weirkote Booklet

Send for the new booklet on Weirkote today. Write Weirton Steel Company, Dept. M-6 *Weirton, West Virginia.*

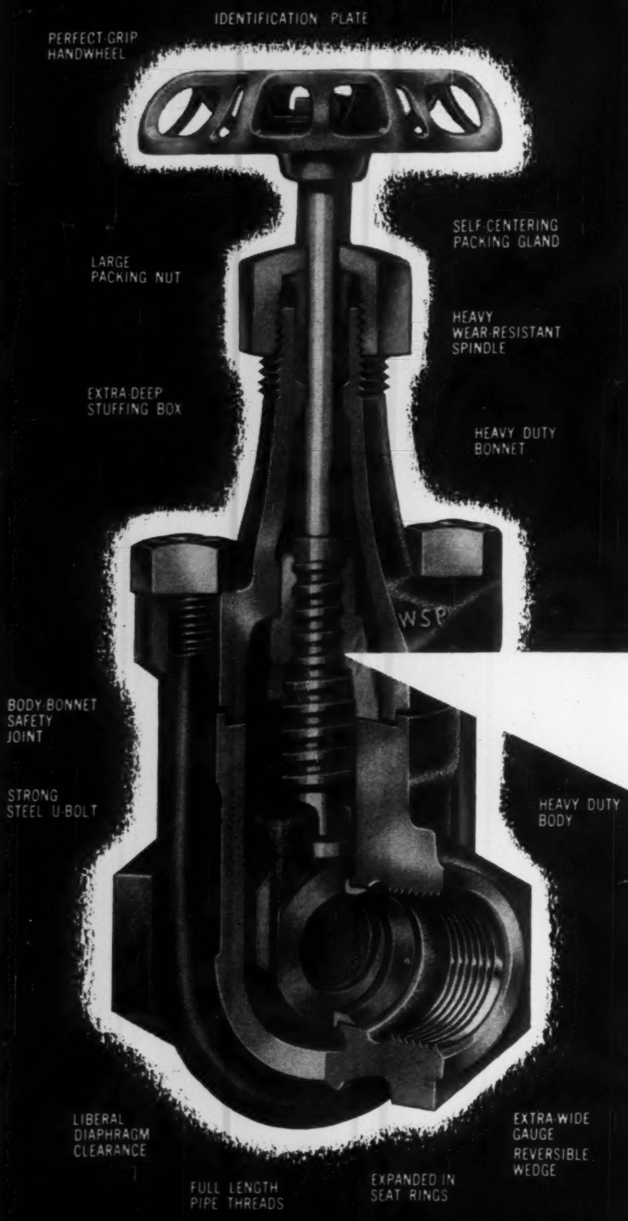
WEIRTON
STEEL
COMPANY

WEIRTON STEEL COMPANY
WEIRTON, WEST VIRGINIA
a division of
NATIONAL STEEL CORPORATION

Only the big line of

JENKINS U-BOLT GATES

has all these dollar-saving features


IDENTIFICATION PLATE
PERFECT GRIP HANDWHEEL
SELF-CENTERING PACKING GLAND
LARGE PACKING NUT
HEAVY WEAR-RESISTANT SPINDLE
EXTRA-DEEP STUFFING BOX
HEAVY DUTY BONNET
WSP
BODY-BONNET SAFETY JOINT
STRONG STEEL U-BOLT
HEAVY DUTY BODY
LIBERAL DIAPHRAGM CLEARANCE
EXTRA-WIDE GAUGE
REVERSIBLE WEDGE
FULL LENGTH PIPE THREADS
EXPANDED-IN SEAT RINGS

WIDE CHOICE

Inside Screw and O.S.&Y., patterns . . . Iron Body with Bronze or Stainless Steel Mounting, All Iron, Ni-Resist with Type 316 Stainless Steel trim. GET FOLDER NO. 207 about the complete line. Ask your local Jenkins Distributor, or write Jenkins Bros., 100 Park Avenue, New York 17.

Priced no higher

DESIGNED TO COST LESS TO USE

Built right into a Jenkins U-Bolt Gate Valve are dollar-saving features no other can match. Construction superiorities that equip this valve to take punishment longer . . . saving dollars in replacement bills. Features that cut maintenance time and the cost of replacement parts . . . saving more dollars. For a good example, look at the unique Renewable Bonnet Saver Bushing which is a patented feature of Inside Screw valves.

BONNET-SAVER BUSHING

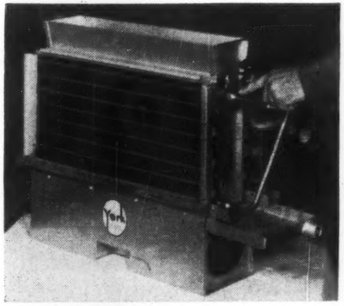
No need to junk a bonnet with worn operating threads. Just slip in a new bushing for good-as-new thread engagement . . . saving bonnet and lengthening spindle life.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS
SINCE 1864
Jenkins Bros

Sold Through Leading Distributors Everywhere

EQUIPMENT DEVELOPMENTS . . .

For reviews of Recent Trade Literature see Page 287



Induction System . . .

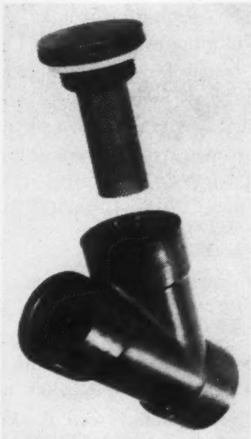
. . .designed for heating and cooling in multi-story, multi-room buildings — *York Corp., Commercial Div., Subsidiary of Borg-Warner Corp., Dept. HPAC, Roosevelt Ave., York, Pa.*

New system uses high capacity double coil room unit with high secondary coil capacity; requires no changeover point from chilled to hot water, company says. Three features highlighted by manufacturer include: (1) use of smaller primary air preheaters, dehumidifiers, reheaters, central fans, primary air ducts; (2) less rigging and assembly time, smaller ductwork requirements; (3) low horsepower and small primary air needs, reduced water chilling requirements. Room units available in 12 in. floor, 20 in. wall models with coil lengths 20, 28, 36, 48 in.

Differential Converter . . .

. . .with range continuously adjustable from 0-5 to 0-25 in. of water — *Minneapolis-Honeywell Regulator Co., Industrial Div., Dept. HPAC, Wayne and Windrim Aves., Philadelphia* 44.

Unit adaptable to continuous measurement, control of specific gravity of liquids in open vessels. In each of seven methods of measurement, pressure exerted by column of reference liquid is balanced against that of equal column of measured liquid. Differential pressure is transmitted to recording instrument actuated by pneumatic receiver element, company says.



Plastic Strainer . . .

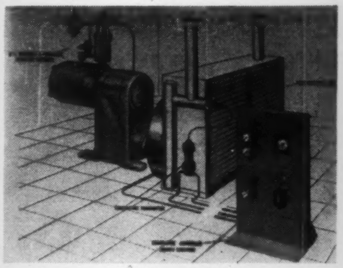
. . .made of polyvinyl chloride — *Walworth Co., Dept. HPAC, 60 E. 42nd St., New York* 17.

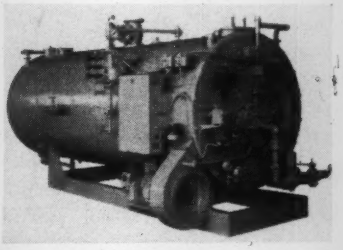
Designed for service on alkalis, acids, inorganic salt solutions, other corrosive materials. Available with either threaded, solvent weld socket type of flanged ends, in sizes 2 to 12 in. Service ratings 150 psi at 75 F, 75 psi at 150 F.

Speed Control System . . .

. . .for providing controlled variable speed for fans or pumps in heat exchange processes — *U. S. Electrical Motors, Inc., Dept. HPAC, 200 E. Slauson, Los Angeles* 54.

New automatic system consists of "Varidrive" motor equipped with automatic control, temperature sensing transmitter, control panel. Designed to provide accurate control, give prolonged performance with minimum of attention, manufacturer says. May be used with heat exchange systems operating at pressures to 1000 psi.





Automatic Boiler . . .

. . .featuring simplified construction, operation — *Ames Iron Works, Inc., Dept. HPAC, Box 13, Oswego, N. Y.*

Three-pass concentric tube design permits use of one-piece rear baffle, one-piece fuel covers, both swung on davit hinges for easy access, company says. Auxiliaries, controls centrally located; new simplified oil preheating system incorporated. Available in sizes 10 to 150 hp for pressure to 250 psig for oil, gas or combination oil-gas firing equipment.

Centrifugal Fans . . .

. . .with airfoil blades — *Westinghouse Electric Corp., Dept. HPAC, Box 2278, Pittsburgh.*

Available for effective range of applications including building ventilation, general air supply and exhaust, conventional and high pressure air conditioning, industrial processing, tunnel and combustion air supply. Airfoil blades create streamlined air flow pattern, make possible quieter operation, company says. Units will handle to 700,000 cfm at pressures to 16¾ in. WG.

Radiation Units . . .

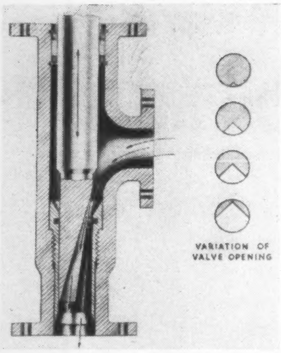
. . . with new element cradles, streamlined enclosures — *Trane Co., Dept. HPAC, La Crosse, Wis.*

Cradles ride freely, quietly on sound-eliminating ball bearings, company says. Cabinet selections in three styles with lengths 1 to 6 ft in 6 in. increments. Each available in 4 or 5¼ in. depth model, three standard enclosure heights. Other features cited: damper control for positive, efficient temperature control; multiple choice of elements in steel or copper-aluminum construction.

Pipe Fitting . . .

. . . with self sealing feature — *Flick-Reedy Corp., Dept. HPAC,* 2040 *N. Hawthorne Ave., Melrose Park, Ill.*

"Tru-Seal" designed to stop leaks at pipe connections by means of threaded teflon plastic insert. Available in pipe thread sizes ¼ through 2½ in., unit will hold seal under ultimate pressures of 10,000 psi, under temperatures from −200 to 500 F, company says. Plastic insert may be used in pipe circuits carrying oil, water, gas, air, steam, chemicals and vacuum lines.



Tapered Orifice Valve . . .

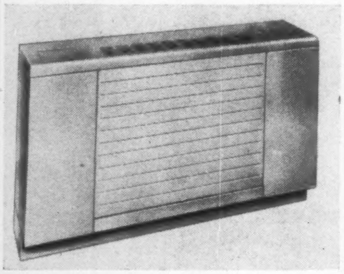
. . . for accurately controlling flow of liquids and gases — *General-American Valve Co., Dept. HPAC, Box 444, Corona Del Mar, Calif.*

Flows controlled as plug with tapered slot moves into and out of circular opening. Circular sealing ring eliminates bypass. Features cited: passes large foreign particles; nonclogging, nonfreezing, abrasion resistant. Available in variety of sizes, pressure ranges, connections.

Plastic Pipe . . .

. . . for broad field of industrial applications — *A. M. Byers Co., Dept. HPAC, Clark Bldg., Pittsburgh,* 22.

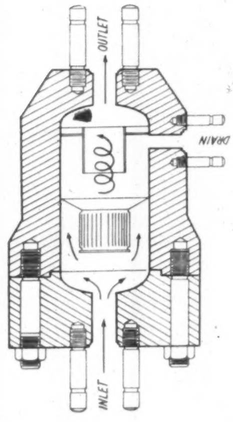
Polyvinyl chloride pipe offered in two types for standard weight, heavy, extra heavy wall thicknesses. "Type 1" designed for chemical and related applications; "Type 2" modified with rubber for mechanically punishing applications, company says. Available in ¼ through 6 in. sizes.



Fan Coil Unit . . .

. . . designed to provide temperature, humidity control throughout large buildings — *National-U.S. Radiator Corp., Dept. HPAC, Box* 1047, *Johnstown, Pa.*

While each unit operates independently, all are supplied with water from central boiler and chiller units. Three-speed motor control system offers three distinct capacities in each unit, reduces capacity for winter heating without disturbing drafts or constant short cycling, manufacturer says. Blower motor mounted in rubber.



Purifiers . . .

. . . designed to withstand pressures to 15,000 psi for air, steam and process vapor, gas lines — *V. D. Anderson Co., Div. of International Basic Economy Corp., Dept. HPAC,* 1935 *W.* 96*th St., Cleveland* 2.

Pressure parts in units are made of alloy steel with special gaskets, pipeline connections. Each purifier put through series of tests including ultrasonic testings, strain gage analyses for deformation, hydrostatic testing to pressures not less than 50 percent above design pressure, manufacturer says. Has no moving parts, filters or mesh screens; operates by means of new two stage principle of separation.

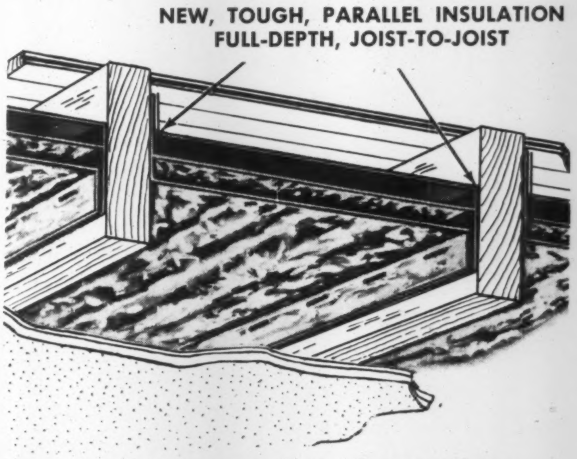
Portable Conditioner . . .

. . . for heating, cooling — *Carrier Corp., Dept. HPAC, Syracuse 1, N.Y.*

New unit weighs less than 60 lb, is 10⅞ in. thick. May be operated as conventional room air conditioner, as heat pump to warm room during intermediate seasons or in mild winter climates, and as dehumidifier. Slide-in wing panels provided to accommo-

Metals are the Best Insulators

Against Heat, Cold, and Vapor in Building Spaces



The surfaces of ordinary IRON have about 4 times the reflectivity against heat rays that the surfaces of asbestos, asphalt, paper, brick, plaster, wood and other ordinary building materials have. Brass, gold, silver and ALUMINUM surfaces have about TEN TIMES the reflectivity against heat rays that non-metallic materials have. Aluminum surfaces, for example, have a 97% reflectivity for RADIATION, whereas the surfaces of most building materials have a reflectivity of only 10%.

RADIATION (heat rays) is responsible for 65% to 80% of all heat flow sideways in building spaces; 55% to 75% upwards; 93% down.

Air space has low density, therefore heat flow by CONDUCTION through the **spaces** inside building walls, roofs, attics or floors is slight. CONVECTION accounts for 15% to 30% of the heat flow sideways in such spaces, and up to 45% upwards. There is NO convection down.

AN EXCELLENT HEAT AND VAPOR BARRIER

Multiple layers of metal, spaced apart, make an excellent barrier to heat and vapor flow in any direction. Prefabricated Multiple Aluminum is installed in one simple operation. Tough metallic sheets are automatically expanded so as to form alternating layers of aluminum, fiber and low density reflective air spaces. The fibrous and metallic sheets retard inner and outer convection.

Its continuous metal layers, up to 750 feet long, have almost zero permeability to vapor. Infiltration under flat stapled flanges is slight. Condensation formation on or within this type of insulation is minimized by its scientific construction. More than 400 million sq. ft. are in use today, a large part of it re-orders.

To obtain MAXIMUM, **uniform-depth** protection against heat loss and condensation formation, it is necessary to use the new **edge-to-edge** multiple aluminum, **each** sheet of which stretches from joist to joist.

You'll enjoy, as well as profit from reading Alexander Schwartz's recently published manual: "Heat Flow by Radiation in Buildings, Simplified Physics." The scientific background of heat flow, specific information on how to control it, data on the various types of multiple aluminum insulation, ratings of insulation performance, and installation techniques under many conditions are interestingly discussed in this liberally illustrated 48 page manual. A FREE copy is yours for the asking.

THERMAL VALUES*, INFRA PARALLEL INSULATIONS
Non-metallic Insulation Equivalents†

	UP-HEAT	DOWN-HEAT	Cost, Installed‡
TYPE 2	C.195=1⅔"	C.061=5⅓"	5¢ sq. ft.
TYPE 3	C.142=2⅓"	C.049=**6¾"**	6¢ sq. ft.
TYPE 4	C.105=**3⅓"**	C.068=**8"**	8¢ sq. ft.
TYPE 5	C.081=4"	C.034=9⅔"	10¢ sq. ft.
TYPE 6	C.068=4⅘"	C.034=9⅔"	11¢ sq. ft.
TYPE 9	C.043=**7¾"**	C.029=**11¼"**	16¢ sq. ft.

Types 1, 7, 8 also available

*Determined by method of National Bureau of Standards in H.H.F.A. Research Paper 32.

†Calculated on basis of limiting thermal values cited in Fed. Specs. LLL-f-321b; HH-I-585; HH-I-521c; HH-I-551a.

‡Approximate cost, material and labor, new construction between wood joists.

CAN BE PURCHASED THROUGH YOUR PREFERRED LOCAL DEALER

Infra Insulation Inc., 525 Bway., N. Y., N. Y. Dept. H-11
Please send "Heat Flow by Radiation."

NAME____________________
FIRM____________________
KIND OF BUSINESS____________________
ADDRESS____________________

EQUIPMENT DEVELOPMENTS

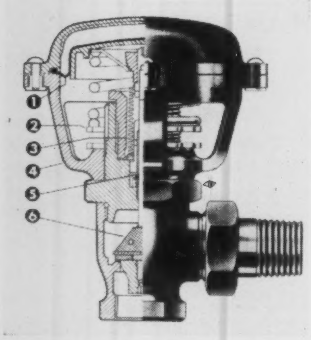
Continued

date any standard window. Styled interior, exterior grilles permit units to be turned around in window as necessary to cool or heat room, company says.

Finned Tube Radiation . . .

. . .for use in commercial, industrial, institutional installations — *American-Standard Plumbing and Heating Div., Dept. HPAC, 40 W. 40th St., New York* 18.

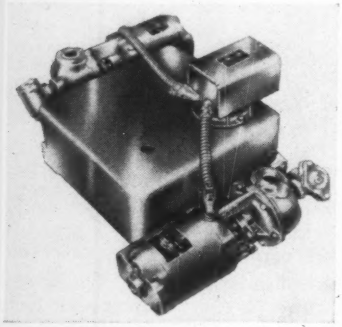
Nonferrous elements, composed of aluminum fins bonded to copper tubing, designed to produce 1180-3930 Btu per hr. at 220 F water. "Temtrim" available in lengths of 2 to 12 ft in 1 ft increments. Fins available in 3¼, 4¼ in. squares, each bonded to 1½ in. copper tubing.



Packless Valve . . .

. . .designed for improved control of unit conditioners, unit ventilators, convectors — *Powers Regulator Co., Dept. HPAC, 3434 Oakton St., Skokie, Ill.*

Features cited by manufacturer: 10 sq in. silicone diaphragm which provides 60 percent greater closing power than previous models; externally adjustable spring, which can close between 5 to 12 psi, has 5 psi range; heavy duty packless bellows which acts as primary seal; lower housing made of high impact phenolic to eliminate electrolytic corrosion. Neoprene quad ring secondary seal said to prevent leakage if packless bellows is damaged. Units available with low pressure bellows for system static pressures to 100 psi, high pressure bellows for pressures to 180 psi. Throttling disc for steam, water to 250 F (15 lb steam).



Condensate Pumps . . .

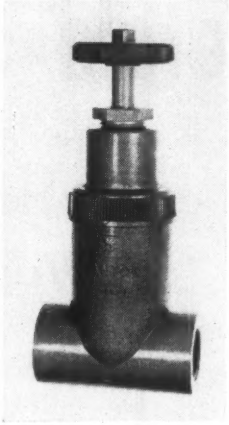
. . .requiring 2 gal for starting — *Decatur Pump Co., Dept. HPAC, Decatur, Ill.*

Units, ¼ and 1/3 hp, handle water to 210 F, will not steam bind, have noncorrosive bronze pumping parts, company says. Hot water capacities available in sizes to handle condensate return from 6000 sq ft of radiation at 10 psi to 1360 sq ft of radiation at 80 psi. Pump parts interchangeable with parts of company's water system pumps.

Preheating System . . .

. . .for use with oil burners designed to burn No. 5 or No. 6 oil — *Fluid Systems, Inc., Dept. HPAC, 1881 Dixwell Ave., New Haven 14, Conn.*

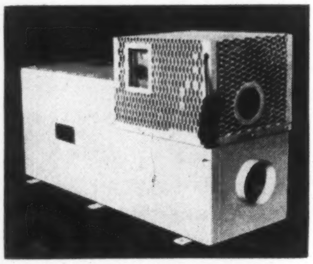
"Thermal Electric System" utilizes low voltage alternating current—impressed on same pipe in which oil is contained—to maintain constant temperatures throughout piping system, company says. Tank unit permits withdrawal of heaviest No. 6 oils from storage without constant circulation or auxiliary heat in tank according to manufacturer.



Plastic Gate Valve . . .

. . .designed to meet problems of conveying corrosive, abrasive liquids in lines that cannot be chemically contaminated — *Vanton Pump & Equipment Corp., Dept. HPAC, 201 Sweetland Ave., Hillside, N. J.*

Unit has both straight through flow, nonpressure drop characteristic of gate valve and throttling flow control feature of globe valve, manufacturer says. Operates by closure of conically shaped plug with synthetic cap cover on it into body. Bonnet, stem assembly can by removed from line and cap replaced without removing body. In 1, 2 in. sizes.



Humidity Controller . . .

. . .for delivering constant humidity air — *Universal Dynamics Corp., Dept. HPAC, Arlington, Va.*

New "Humitrol" maintains relative humidity level within plus or minus 14 percent RH, or better, in air or gas stream, company says. Unit is composed of sensing element, control system, modulating device for use with dehumidifiers, humidifiers, air conditioning equipment. Available in sizes from 20 cfm.

(Continued on page 240)

How high velocity provides maximum comfort for schools

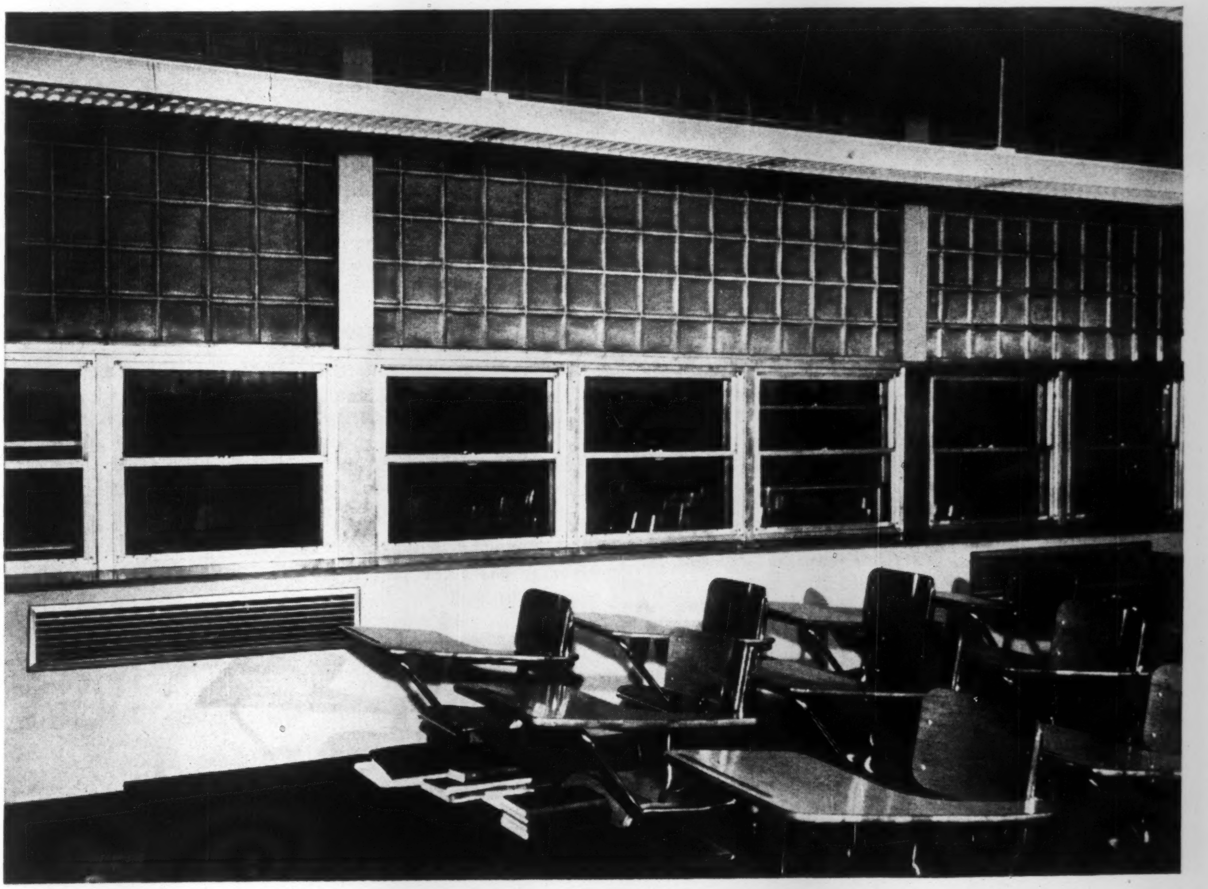
The *Anemostat All-Air High Velocity* system of draftless air distribution offers many important advantages for heating and ventilating schools. ● High velocity units, used with smaller than conventional ducts, save space and money. They substantially reduce sheet metal required, can be installed faster, at less cost. Since there are no coils in All-Air HV units, clogging and odors are eliminated. ● Anemostat *All-Air HV* operate entirely with air processed in the main equipment room; there is, therefore, no need to break through the walls of the building for prime air make-up. The Anemostat *All-Air HV* units eliminate fans, filters, and electric motors in the school rooms. Units are quiet, need a minimum of maintenance from custodians. ● On these pages are typical installations in which the *Anemostat All-Air High Velocity* system has been used successfully. Application data on your specific school heating, ventilating or air conditioning problem is available from Anemostat representatives or from the home office.

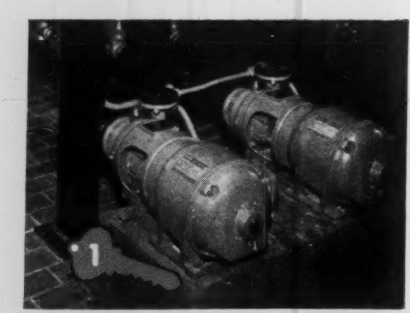
Write on your business letterhead for your copy of

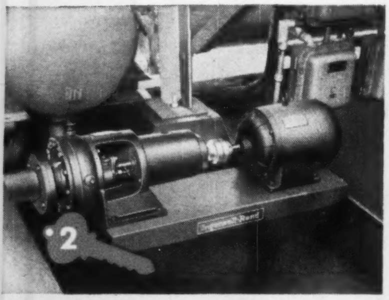
New Anemostat® Selection Manual 60

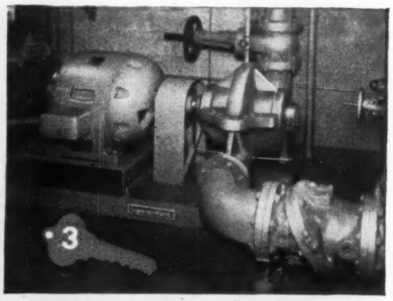
to Anemostat Corporation of America,
10 East 39th Street, New York 16, N. Y.

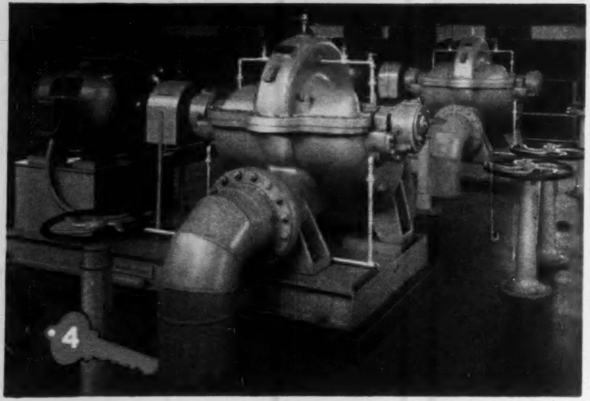
AC 1358

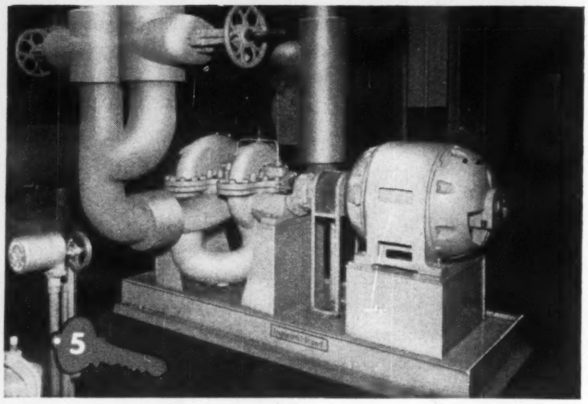












Five Keys to
LONG-RANGE ECONOMY
on your general-purpose pumping jobs

The Ingersoll-Rand pumps shown feature several different designs and types. Yet they all have one thing in common—the ability to give you low-cost performance on your general purpose pumping jobs.

When you install an I-R pump, you can count on continued efficient operation—with a minimum of time out for attention and maintenance.

In addition to the pumps shown, Ingersoll-Rand manufactures a complete line of single and multi-stage pumps of horizontal and vertical design for every job application. See your I-R representative for full information on the pump which best meets your needs.

1. MOTORPUMPS: Free from base plates, couplings and alignment problems, I-R Motorpumps can be mounted in any position that gives the simplest, most economical installation. They are especially designed for continuous full load service, with a wide range of capacities from 5 to 1800 gpm and heads up to 600 ft. Available in single, two and four-stage units.

2. CRADLE-MOUNTED PUMPS: Built with separate pump and drive units, coupled and mounted on a sturdy base plate, I-R Cradle-Mounted Pumps come in one and two stages, with capacities from 5 to 2800 gpm and heads up to 525 ft. They can be equipped with any drive, and provide easier accessibility, over-sized bearings and greater accessibility.

3. SINGLE-STAGE HORIZONTALLY-SPLIT PUMPS, with double mechanical shaft seals: For capacities from 275 to 2400 gpm and heads to 350 ft., maintenance-free DMV and DHV pumps are provided with double mechanical shaft-seals and permanently lubricated sealed bearings. Troublesome stuffing box maintenance is eliminated, and bearings do not require any attention or lubrication throughout the life of the pump.

4. SINGLE-STAGE HORIZONTALLY-SPLIT PUMPS, conventional design: The Class AFV unit illustrated is typical of the standard I-R line of single-stage horizontally-split centrifugals, with capacities ranging from 25 to 50,000 gpm, and heads from 20 to 350 ft. Stuffing boxes are extra deep, and equipped with water seal cages. Any type of drive may be used.

5. TWO-STAGE HORIZONTALLY-SPLIT PUMPS: I-R two-stage Class GT pumps are available in capacities up to 2200 gpm for discharge heads up to 1050 ft. Outstanding performance is assured by such features as extra deep stuffing boxes, renewable shaft sleeves and wearing rings, carefully designed liquid passages and volutes, and efficient closed-type impellers.

IR

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10-455 **11 Broadway, New York 4, N. Y.**

PUMPS • ROCK DRILLS • GAS & DIESEL ENGINES
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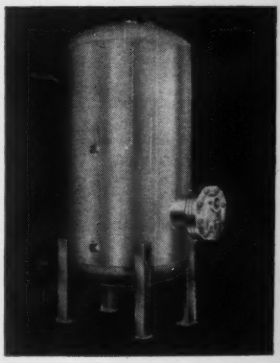
RECO Hot Water on Duty at D. C. Hospital Center!

When three Washington hospitals merge into one huge D. C. Hospital Center, the hot water demands will be enormous.

RECO hot water storage heaters and tanks were designed to meet and beat these hot water needs. Twenty-nine pieces of RECO heat exchange equipment will keep thousands of gallons of hospital-pure hot water always on tap for the new 800-bed center. Hundreds of hospitals from coast to coast now rely on round-the-clock hot water service by RECO.

Let *RECO* fill *your* hot water needs. On your next job—specify the full line of RECO Hot Water Storage Heaters, Convertors and Instantaneous Heaters.

For name of nearest RECO representative, write Dept. R, RECO, 7th & Hospital Sts., Richmond 5, Va.



RICHMOND ENGINEERING CO., INC.

DON'T BUY OUTDATED PERFORMANCE...

order Chicago Airfoil Bladed Fans

Aerodynamically shaped blades cut H.P. up to 35% and move more air with 65% less noise. Fans rated 600 to 1 million cfm.

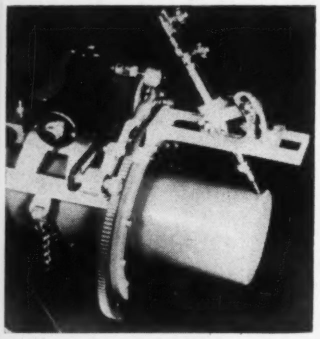
Write for Bulletin A-102

CHARTER MEMBER of A.M.C.A.

CHICAGO BLOWER CORP.
9865 Pacific Ave., Franklin Park, Ill.
See Phone Directory for Sales Offices

EQUIPMENT DEVELOPMENTS

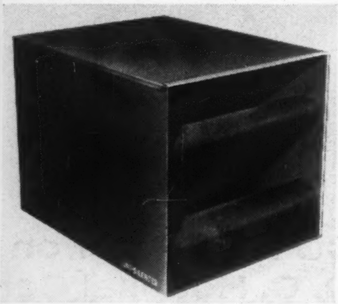
Continued from page 236



Pipe Beveling Units . . .

. . .for automatic operation in cutting, beveling on pipe — *H & M Pipe Beveling Machine Co., Dept. HPAC,* 311 *E. Third, Tulsa, Okla.*

Units, ranging in size ½ to 36 in., powered by fractional horsepower a-c, d-c electric motor affixed to cutting, beveling machines by means of mounting brackets. Switching from manual to automatic or vice-versa made easy by quickly detachable mounting brackets, company says. Flexible coupling connects motors with crank pinions which drive main gears, cutting torches around pipes.



Silencers . . .

. . .designed to reduce noise generated by fans — *Elof Hansson, Inc., Acoustical Div., Dept. HPAC,* 711 *Third Ave., New York* 17.

New "Uni-Silencers" measure 24 × 24 × 32 in., weigh 75 lb. When airflow, pressure drop, noise problems require use of more than one unit, individual units may be put together side by side or on top of each other using slip joints provided, company says. With high frequency labyrinth, low frequency attenuators.

DON'T BUY OUTDATED PERFORMANCE...

order Chicago Airfoil Bladed Fans

Aerodynamically shaped blades cut H.P. up to 35% and move more air with 65% less noise. Fans rated 600 to 1 million cfm.

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"from Chicago"

MODERN TODAY
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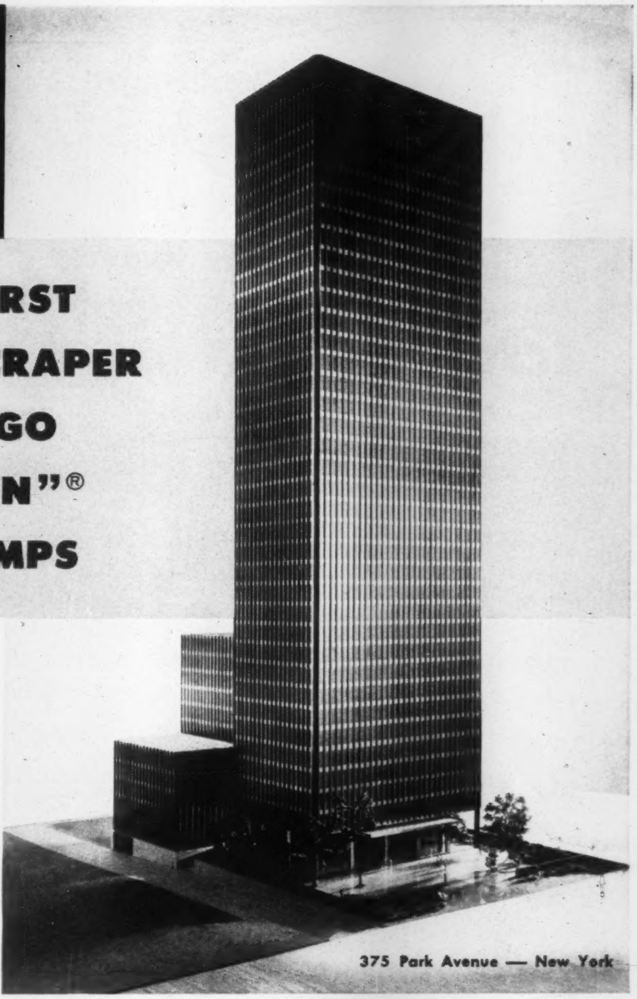
WORLD'S FIRST BRONZE SKYSCRAPER HAS CHICAGO "FLUSH KLEEN"® SEWAGE PUMPS


375 Park Avenue — New York

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KAHN & JACOBS
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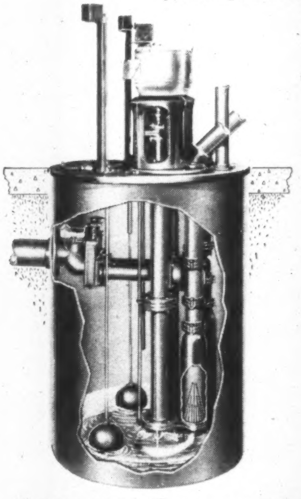
plumbing contractor

- The new 375 Park Avenue Building, New York, literally has EVERYTHING— and *everything* is QUALITY. Quality ideas, plans, materials and workmanship have provided such modern conveniences as year-round peripheral zoned air conditioning with balanced humidity and finger-tip control, 18 electronically controlled high-speed elevators, closed circuit color television, special non-glare exterior glass walls, etc. Chicago "FLUSH KLEEN"® Sewage Pumps have provided for continuous, trouble-free waste disposal service.

More than 12,000 Chicago "FLUSH KLEEN"® Sewage Pumps have been installed as standard equipment in fine buildings everywhere — and NOT ONE HAS EVER CLOGGED. Only liquid reaches the pump impeller. There is no contact between the pump's working parts and coarse sewage material.

This is why Chicago Pump Company "FLUSH KLEEN"® Sewage Pumps have an unequalled record of clog proof performance and are preferred throughout the building industry.


"FLUSH KLEEN"® Sewage Pump . . . Automatically Backwashes Strainer . . . Strainer Keeps Solids From Basin and Pump . . . Water Only Handled By Impeller.

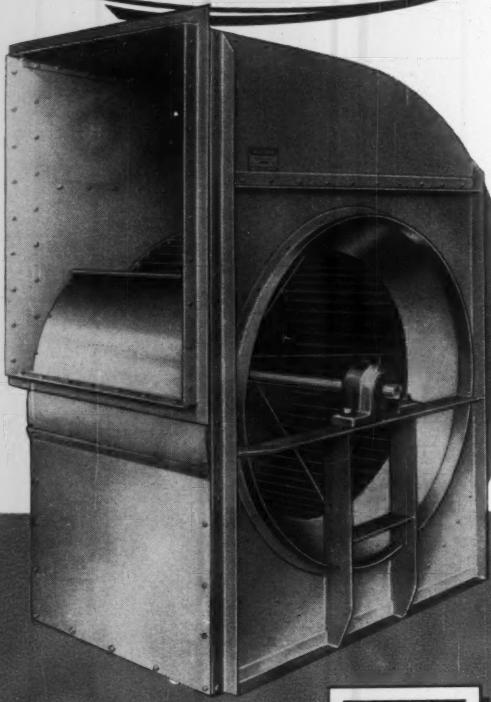
CHICAGO PUMP COMPANY

Building Pumps

Subsidiary of Food Machinery & Chemical Corporation

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION

622 Diversey Parkway
Chicago 14, Illinois



Aladdin
AIR HANDLING EQUIPMENT

FANS with built-in quality

- EFFICIENT
- QUIET OPERATING
- CERTIFIED RATINGS

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Centrifugal, Axial, and Propeller Fans adopted jointly by the National Association of Fan Manufacturers and the American Society of Heating and Ventilating Engineers.

AUTHORIZED BY
NAFM

© THE NATIONAL ASSOCIATION OF FAN MFGRS., INC.

ALADDIN Series 94 Type FC Fans are available in 22 sizes both single and double width. These fans have been designed for the lowest rotational speeds consistant with high efficiency over the widest possible range of operating conditions.

Each fan is ruggedly built... fully equal to the job for which it is designed, and is backed by thirty-five years of know-how in manufacturing all types of air handling equipment.

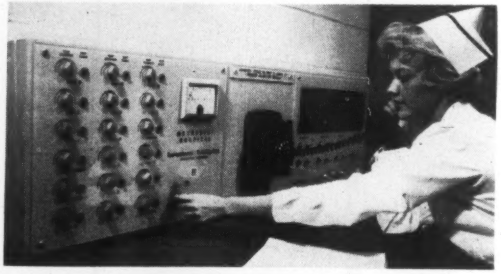
Write for complete data

ALADDIN HEATING CORPORATION
1111 WEST AVENUE 137 • SAN LEANDRO, CALIFORNIA

A3-57

EQUIPMENT DEVELOPMENTS

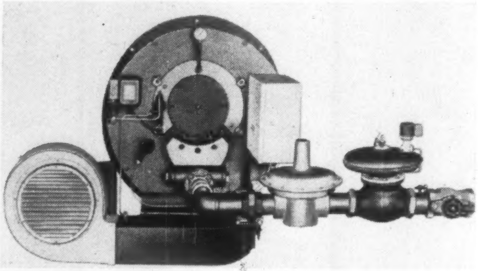
Continued



Remote Control System . . .

. . . designed to remotely regulate temperatures in hospital areas — *Minneapolis-Honeywell Regulator Co., Dept. HPAC, 2753 Fourth Ave., S., Minneapolis 8.*

"Hospital Master" consists of control panel with telephone, calibrated knobs for setting temperature in particular locations, and buttons that, when pressed, register exact temperature on indicator. Sensitive microphones may be placed in locations chosen by hospital officials, become operative by switching that makes telephone on control panel ring. Other control functions may be incorporated into system including fire alarm, low room humidity alarm, room lighting control, etc.



Gas Burner . . .

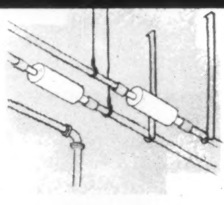
. . . for use with high or low pressure boilers — *Iron Fireman Mfg. Co., Dept. HPAC, 3170 W. 106th St., Cleveland.*

Unit designed to fire all types of gas with high combustion efficiency, wide turn down ratio, company says. Includes forced draft fan, air volume control, enclosed electrical control panel. Available for 3750 to 11,250 Btu per hr nominal input with 3/4 to 2 hp fan motors.

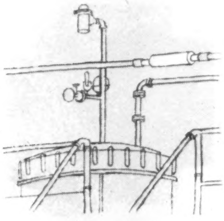
Boiler Fittings . . .

. . . in three new sizes—*Bell & Gossett Co., Dept. HPAC, Morton Grove, Ill.*

Large 6 × 6 in. and small 1½ × 1½ in. fitting for side outlet boilers; new 1¼ × 1½ in. fitting for top outlet boilers added to manufacturer's line. "Airtrol" units engineered by company to end air trouble in hot water heating systems by removing air at boiler.

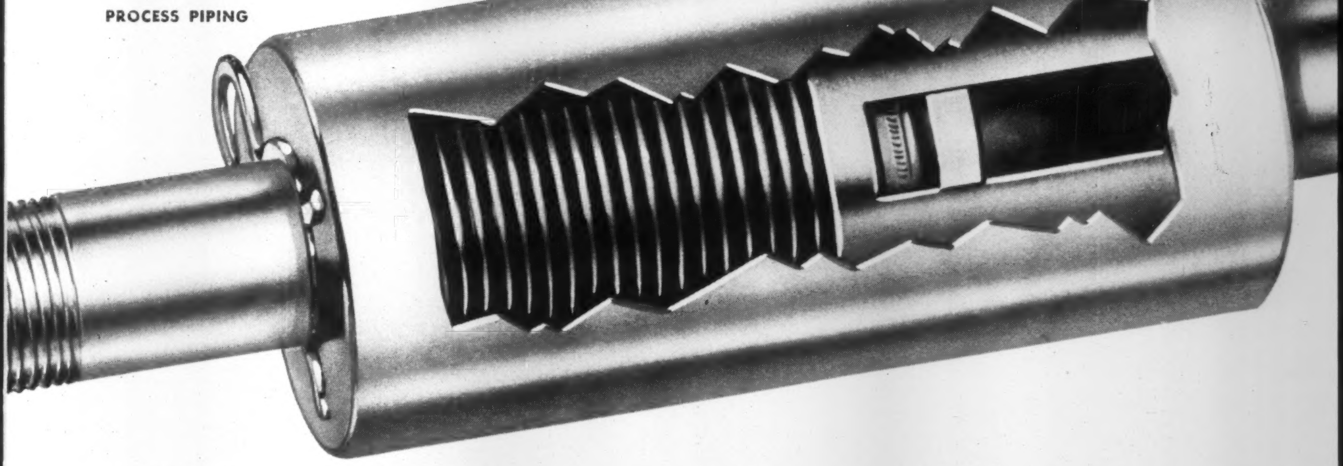


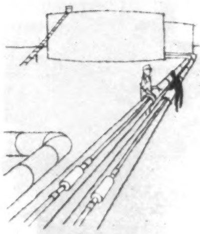
HEATING SYSTEMS



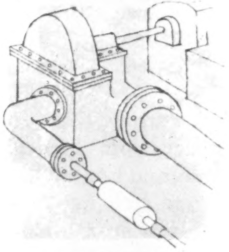
PROCESS PIPING

NOW . . . high-pressure, heavy-duty Expansion Compensator costs far less than old-fashioned methods... *available from stock!*





STEAM TRACING



POWER PIPING

Flexon®

MODEL H EXPANSION COMPENSATOR

Get delivery when you want it! Flexon Model H Expansion Compensators are available from stock. And they cost much less per inch of stroke than any other method of absorbing pipe expansion.

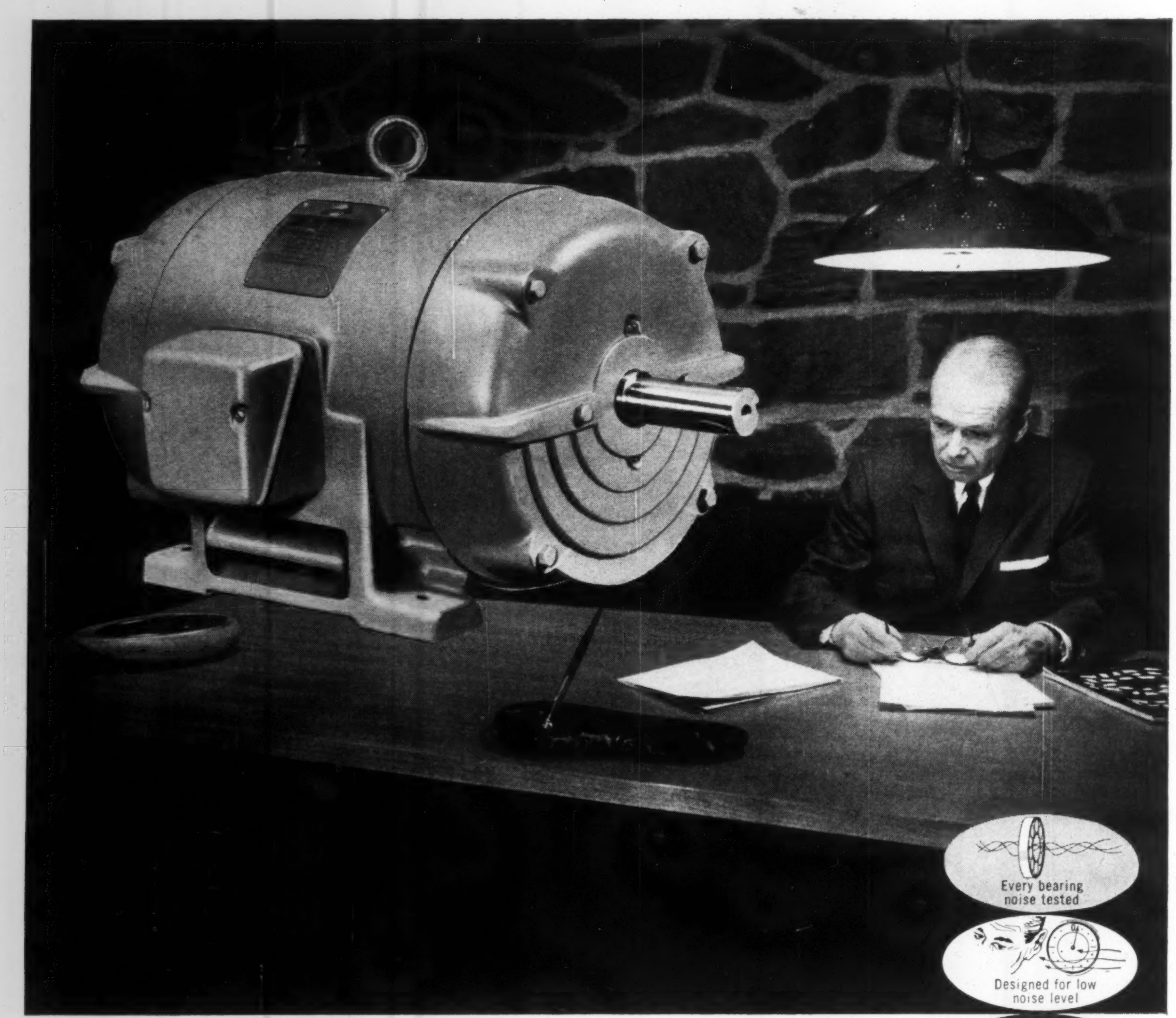
Flexon Model H is made to fit the thousands of industrial piping jobs that use pipe up to 3″ and require less than 1¾″ total movement. It's built for hard service, with 2-ply stainless steel Flexon Bellows, positive anti-torque and anti-squirm device, and full protection from external damage. Completely packless, it never needs maintenance. Working pressures up to 150 p.s.i. for ¾″ and 1″ sizes; up to 100 p.s.i. for larger sizes.

Write for facts about Flexon Expansion Compensator, design and cost data, and the name of your Flexon distributor.

Flexonics
corporation

EXPANSION JOINT DIVISION • 1391 S. THIRD AVENUE, MAYWOOD, ILLINOIS

EXPANSION JOINTS · METAL HOSE · NON-METALLIC HOSE · BELLOWS · AIRCRAFT COMPONENTS



Air conditioned comfort without hum

Commercial air-conditioning installations use Louis Allis "quiet" motors

In today's modern executive and general offices, silent operation is a prime specification for the air-conditioning installation. Busy people suffer adversely from any resonance or hum induced in the system by the drive motor. Efficiency drops — irritability climbs — and worker output falls.

That's why Louis Allis motors — the motors with the built-in "hush" — are finding wide acceptance in air-conditioning service. They are specifically *designed* to be quiet. Every bearing is noise tested . . . end bells and frame are engineered for low, low noise levels . . . sturdy, heavy-section cast-iron housing construction is remarkably resonance-free. Matching this desirable operating characteristic is dependable maintenance-free construction: locked bearings mean extra long bearing life, and Louis Allis insulation protects against moisture and heat to assure steady, dependable performance even under the most adverse operating conditions.

Make us prove it. Contact your Louis Allis District Office and arrange to have an expert motor sales engineer stop by and advise you on your air-conditioning drive installation. Or write the Louis Allis Co., 453 East Stewart St., Milwaukee 1, Wisconsin.

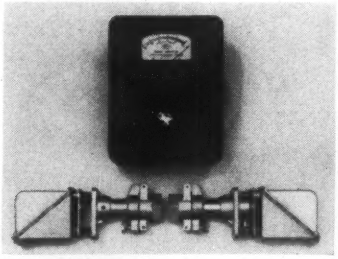
LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Solenoid Valve . . .

. . . rated to 6000 psi — *Atkomatic Valve Co., Inc., Dept. HPAC, 545 W. Abbott St., Indianapolis 25.*

New two-way stainless steel unit designed to control high pressure corrosive gases, fluids. Available in 1/8, 1/4, 3/8, 1/2 in. pipe sizes; port sizes depend on maximum pressures, viscosity of media. Can be supplied with explosion proof housing, "Bubble-Tight" construction for use with elusive gases, teflon or nylon seats, company says.



Smoke Density Indicator . .

. . . for pressurized breechings — *Electronics Corp. of America, Dept. HPAC, 77 Broadway, Cambridge 42, Mass.*

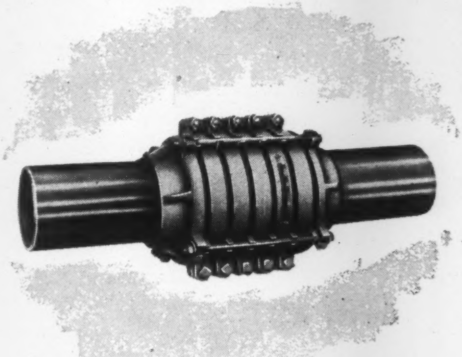
Pressure sealing flanges seal sighting tubes on which light source, scanner are mounted. Unit provides continuous, accurate monitoring of smoke discharge, overall indication of combustion efficiency, company says. Designed for stability, simplicity of installation, reliable trouble free operation. Chart recorders available for continuous record of smoke conditions.

19,862 years of precision metal-forming

When you specify FLEXON® Expansion Joints, you actually *buy time*—19,862 years of combined experience in the team of engineers, metallurgists, and technicians who produce Flexon Expansion Joints!

And all this time has been invested in perfecting formed and corrugated tubular shapes in metal, made with watch-like precision—flexible metal hose, instrument-type bellows, "impossible" bends and section modulations for aircraft parts . . . **and expansion joints of every kind.**

So—for expansion joints that you can *install and forget*—always specify FLEXON. Free-flexing and controlled-flexing; dual and multiple types; balanced joints and other special designs; all in stainless steel, monel, and other workable alloys. Assured longer service life, through careful analysis of your application plus unmatched skill in manufacture.



Write today for your copy of the Flexon Expansion Joint Design Guide—28 pages of facts about absorbing pipe motion.

EJ-210

Flexonics corporation

EXPANSION JOINT DIVISION—1391 S. THIRD AVE., MAYWOOD, ILL.

EXPANSION JOINTS · METAL HOSE · NON-METALLIC HOSE · BELLOWS · AIRCRAFT COMPONENTS

When **HEAT** or **CORROSION** Add to Your Pressure Piping Problems . . .

Protect Pipe Joints with . . . W-S

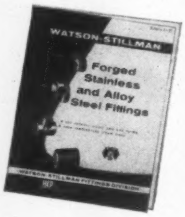
FORGED STAINLESS or ALLOY STEEL FITTINGS

IN CORROSIVE SERVICE your pipe joints take a beating—fluid velocity and turbulence accelerate corrosion wherever there is a change in direction of flow.

AT HIGH TEMPERATURES structural changes in the metal can cause loss of strength and subsequent failure.

Those are good reasons for "playing it safe" in high pressure service with W-S Forged Stainless or Alloy Steel Pipe Fittings. W-S, Stainless Fittings resist corrosion in a wide variety of process liquids and gases and high temperature steam. Available in Types 304, 316 and 304 L.

W-S Alloy Steel Fittings resist oxidation and graphitization and retain their high strength in high pressure—high temperature steam lines. Three alloys available—1¼% Chrome-½% Molybdenum and 2¼% Chrome-1% Molybdenum and 4-6% Chrome-½% Molybdenum.



WATSON-STILLMAN

Forged Stainless and Alloy Steel Fittings

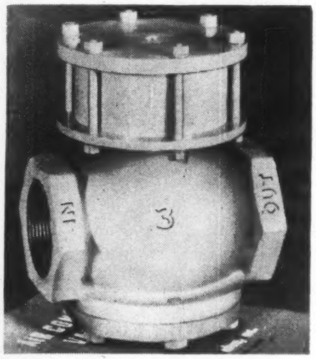
W-S Forged Stainless and Alloy Steel Fittings can be obtained in Screw-End Type for 2,000 lb., 3,000 lb., and 6,000 lb. WOG service; Socket-Welding Type for Schedules 40, 80, 160 and Double-Extra Heavy Pipe. Send today for bulletin S-1-55.

Write to W-S Fittings Division, H. K. Porter Company, Inc., P.O. Box 95, Roselle, N. J.

H. K. PORTER COMPANY, INC.
W-S FITTINGS' DIVISION

EQUIPMENT DEVELOPMENTS

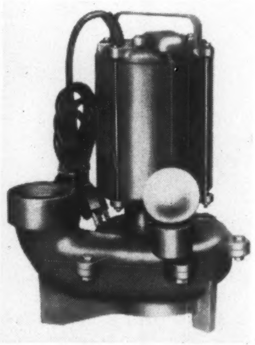
Continued



Pilot Valves . . .

. . .in pipe sizes 1½ through 3 in. — *Airmatic Valve, Inc., Dept. HPAC,* 7317 *Associate Ave., Cleveland* 9.

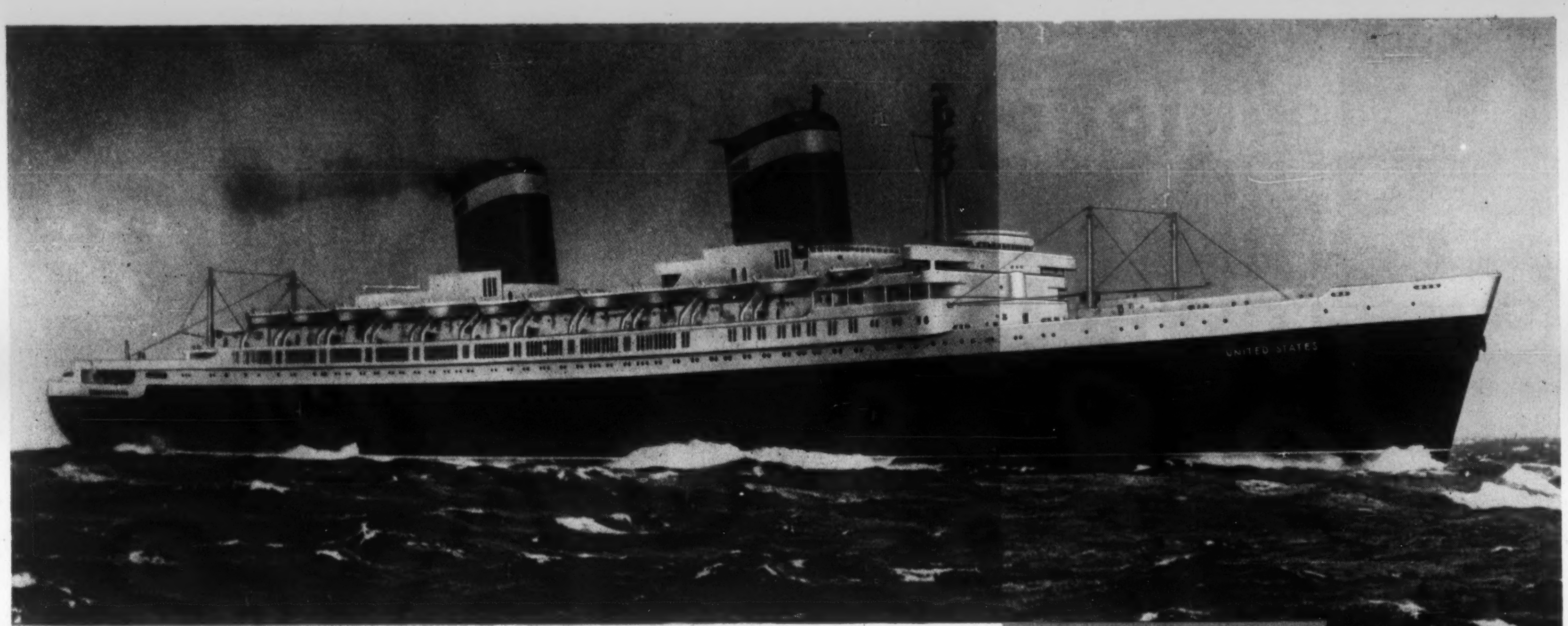
Units provide flexibility of remote control for all types of industry, company says. Normally closed or open, they can be used with air, oil, water, vacuum for pressures 0 to 500 psi. Features cited by manufacturer: only one moving part; positive bubble tight shutoff; noncorrosiveness; compactness; is self compensating.



Ejector Pump . . .

. . .for basements having overhead sewers, powder rooms — *S. Gelber and Sons, Inc., Dept. HPAC,* 5806 *N. Lincoln Ave., Chicago* 45.

Unit is screenless, clogfree; constructed to handle any waste materials that may enter sump pit, manufacturer says. Features cited: submersible 1/3 hp motor; 2 in. discharge pipe connection; self adjusting rotary shaft seal; lifetime lubricated ball bearings. Has capacity of 4000 gph at 5 ft discharge head.



BECAUSE DEPENDABILITY IS A MUST THE S. S. UNITED STATES USES TACO CIRCULATORS EXCLUSIVELY*

The world's fastest, most modern luxury liner is the pride of the American merchant fleet. She's fitted out with only the finest products in the world . . . each designed to render that essential dependable performance.

And you can have the same Taco quality circulators with the same Taco dependability on your hot water heating installations that are on the S. S. United States.

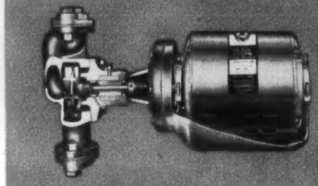
All you need do is specify and buy Taco, because there is *no substitute for TACO quality.* Technical Data Sheets furnished upon request.

**And Taco Heat Exchangers*

TACO HEATERS, INCORPORATED
1160 CRANSTON STREET, CRANSTON 9, R. I.

BETTER HEATING Taco BETTER WITH TACO

Corporate Office: 342 Madison Avenue, New York 17, New York
In Canada: Taco Heaters of Canada, Ltd., 4 Gilead Place, Toronto 2



THE POWER-PACKED
TACO CIRCULATOR,
QUALITY BUILT
FOR SMOOTH,
QUIET OPERATION

DURO
DYNE
announces
NEW INSULATION
ADHESIVE
IA-22

DURO
DYNE
INSULATION ADHESIVE
FOR BONDING
INSULATION TO DUCTWORK
IA-22
DURO-DYNE CORPORATION

Coverage:
Brush Application — 230 + sq. ft. per gallon
Roller Application — 270 + sq. ft. per gallon
Temperature Range:
— 30°F to 325 + °F (Blanket)
— 30°F to 250 + °F (Board)

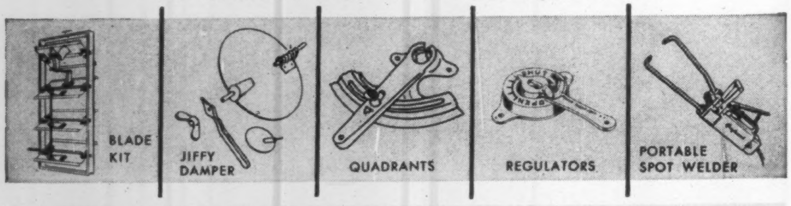
At last! A specific use adhesive designed for a quick, strong, permanent bond of insulation to sheet metal.

Duro-Dyne's new Insulation Adhesive IA-22 was created for bonding insulation to metal; insulation to insulation (at joints); sealing joints; "Buttering" insulation edges. Designed for glass-fiber, asbestos and cork insulation, etc.

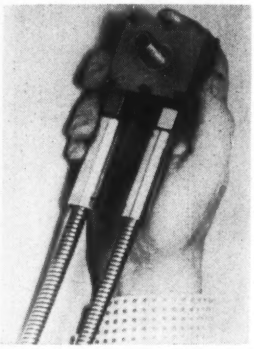
Tack time is only 10 seconds! This means the bond is immediate and positive. What's more, long "open time" range permits bond one hour or longer after application of adhesive. Permits rapid coating of duct surfaces and provides positive bond of heavy insulating materials without auxiliary holding devices.

Duro-Dyne Adhesive IA-22 is water proof, clear in color, solvent in petroleum-naphtha or white gas. Requires no thinning. For full details, write today.

The Greatest Name in Sheet Metal Specialties



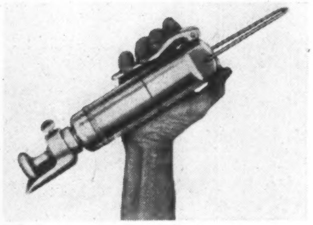
DURO-DYNE CORP., 800 Third Avenue, New Hyde Park, N. Y.



Positioning Device . . .

. . .for independent settings of position and angle — *Aerotech Specialties, Inc., Dept. HPAC, Glastonbury, Conn.*

Unit is remote controlled, designed for accurate positioning of probes although capable of developing thrust of 100 lb, company says. Device, up to ½ in. maximum diameter, is mounted to project through hollow lead screw. Linear position may be adjusted, measured to 0.001 in. accuracy. Rotation can be measured to 0.1 F, unlimited rotation in either direction with maximum speed of 1.5 rpm.



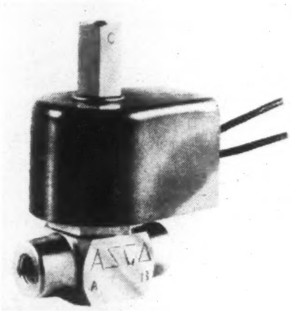
Air Hammer . . .

. . .for sheet metal work — *E. V. Nielsen, Inc., Dept. HPAC, 128 Broad St., Stamford, Conn.*

Unit weighs 4½ lb, designed to seal any lock seam lock former can produce in all sheet metals to 18 gage steel in one swift pass, company says. Full control of blow force at tool maintained by twisting impact control behind trigger. Automatic cutoff that prevents operation cited by manufacturer as safety feature. Operates at air line pressures 30 to 100 psi.

EQUIPMENT DEVELOPMENTS

Continued



Solenoid Valve . . .

. . .for air, gas, water, light oil, refrigerants — *Automatic Switch Co., Dept. HPAC, Florham Park, N. J.*

Unit may be applied to any three-way valving requirement regardless of direction of flow or points of pressure application without any change of springs, other adjustments, company says. Features cited: packless construction, interchangeable service, brass or stainless steel bar stock bodies. Available in 1/8 in., 1/4 in. pipe sizes, 3⅝ in. high.

Safety Switch . . .

. . .for gas burners — *Hastings Air Control, Inc., Dept. HPAC,* 3215 *Leavenworth St., Omaha, Neb.*

New switch insures delivery of both primary, secondary air before opening the automatic gas valve, company says. Switch eliminates unsafe condition of commonly used centrifugal switch or valve which admits gas to burner even if air shutter is accidentally closed. Features cited: 100 percent safety shutoff; runner type pilot ignitor.

AIR IS THE VILLAIN!

in hot water heating or chilled water cooling systems

MAID-O'-MIST

Automatic AUTO-VENTS

CONTINUOUS VENTING ACTION
ENDS CIRCULATION WORRIES!

Float Type

No. 7 AUTO-VENT

No wonder Number 7 is a big favorite with both heating and air-conditioning experts! Fully automatic, this brass vent has a self-closing, float-operated valve — all mounted on a removable bonnet for quick servicing. Small (4⅜" x 2¼" with ⅛" I.P. female connection) it does a big job of eliminating air. For pressure up to 75 lbs.

Float Type

No. 67 AUTO-VENT

Is the space limited? Then No. 67 is your Auto-Vent! Its overall size is only 3 3/16" x 1½" with ⅛" I.P. male connection. Takes 30 lb. pressure.

No. 72 AUTO-VENT

A fast-venting valve of the expansion type for convectors, baseboard and free-standing radiation. For vertical or horizontal mounting, Size 1¼" x ½" with ⅛" I.P. male connection. Disc dries quickly because of immediate drainage.

Float Type

No. 27 AUTO-VENT

Smaller sized (3" x 2½") for horizontal mounting with ⅛" I.P. female side connection. Use on convectors, radiant coils, etc. Takes up to 50 lb. pressure.

Float Type

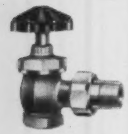
No. 37 AUTO-VENT

Similar to No. 27, but designed for horizontal mounting with ⅛" I.P. vertical male bottom connection. Size 3" x 2½". 50 lb. pressure.

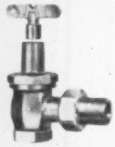
Get full information from your jobber or write for catalogue, today!

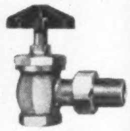
MAID-O'-MIST, Inc.
3217 NORTH PULASKI ROAD · CHICAGO 41, ILL.

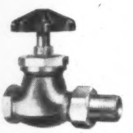
MARSH PACKLESS RADIATOR VALVES

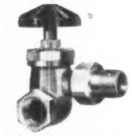

WHEEL HANDLE

GRADUATED

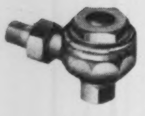

LOCK AND SHIELD

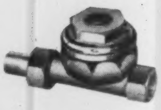

ANGLE PATTERN

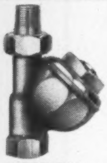

GLOBE PATTERN


CORNER PATTERN (Sectional Below)

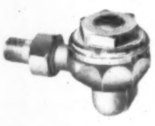
MARSH THERMOSTATIC RADIATOR TRAPS

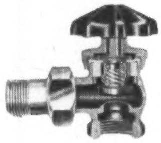

ANGLE PATTERN


STRAIGHTWAY PATTERN

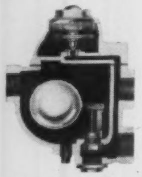

VERTICAL PATTERN

LEFT HAND CORNER PATTERN


RIGHT HAND CORNER PATTERN


CUT OPEN VALVE

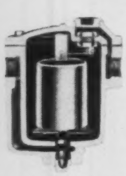
F & T TRAPS


No. 12, REPRESENTATIVE OF WIDE LINE

VENTS

No. 5 VENT, ONE OF MANY

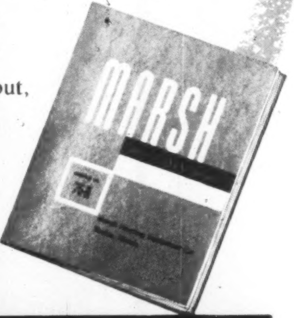
BUCKET TRAPS


No. 500 INVERTED BUCKET TRAP

All the best of their kind!

You probably have made certain Marsh products your standbys without realizing there are a lot more of them just as superlative as the ones you like so well.

Make the acquaintance of some of them here, but, better still—***Ask for this Marsh Catalog!***



MARSH HEATING EQUIPMENT CO.
Sales affiliate of Jas. P. Marsh Corporation
DEPT. T, SKOKIE, ILL.
Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd St., Edmonton, Alberta

Be our guest!

☆ ☆ ☆ We'll be there . . . at the
10th Exposition of Air Conditioning and Refrigeration
Booth No. 201
International Amphitheater • Chicago
Nov. 18-21, 1957
. . . AND we'll provide FREE BUS SERVICE
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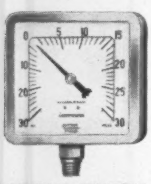
MARSH
Heating Specialties since 1865

MARSH BOILER GAUGES

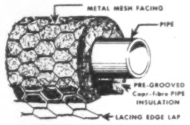
THER-ALTI-METER (Square and Round)


INTERNAL SYPHON (Square and Round)

OUNCE-GRADUATED RETARD (Also Compound)

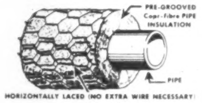
STANDARD (Also Compound)

1


METAL MESH FACING
PIPE
PRE-GROOVED Copr-fibre PIPE INSULATION
LACING EDGE LAP

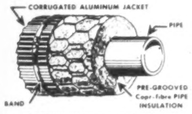
WRAP AROUND

2


PRE-GROOVED Copr-fibre PIPE INSULATION
PIPE
HORIZONTALLY LACED (NO EXTRA WIRE NECESSARY)

LACE ON

3

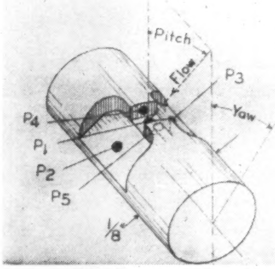

CORRUGATED ALUMINUM JACKET
PIPE
BAND
PRE-GROOVED Copr-fibre PIPE INSULATION

ALUMINUM JACKETING

Pipe Covering . . .

. . . designed for fast installation — *Forty-Eight Insulations, Inc., Dept. HPAC, Aurora, Ill.*

"Copr-fibre Lace-On" is felted mineral insulation, reinforced with metal mesh facing horizontally laced together around pipe. Insulation is pregrooved on inside surface. Recommended by company for pipe lines 2 to 30 in. IPS at temperatures to 1200 F. Thicknesses available from 1 to 5½ in. Among features cited: chemically neutral, moisture resistant, stable, incombustible.


Pitch
Flow
P3
Yaw
P4
P1
P2
P5
1/8

Sensing Probe . . .

. . . for measuring flow velocity, total and static pressures, flow angles — *Aerotech Specialties, Inc., Dept. HPAC, Glastonbury, Conn.*

Unit is made of stainless steel for corrosion resistance with variety of stem lengths, take-off adapters for use to 1500 F. Fits ⅛ to ¼ in. holes. Six pressure holes in tip designed to minimize damage in handling, provide direction sensing properties, company says.

Which of these ventilation problems do you want solved?

General ventilation and comfort cooling? Removal of fumes, dust, heat and steam? Air circulation, rapid product cooling and drying?

Power Line

solves it these 5 ways surer:

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

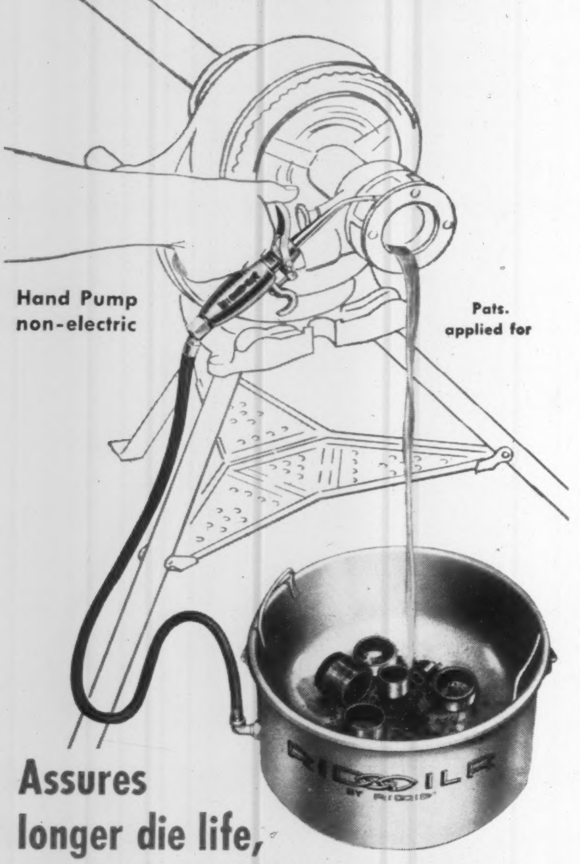
4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of dust resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 64.

POWER LINE FAN COMPANY, INC.
Subsidiary of **Chelsea Products, Incorporated** 635 South Avenue, Plainfield, New Jersey

Handy New Portable
RIDGOILR
gives you plenty of oil
wherever you thread pipe

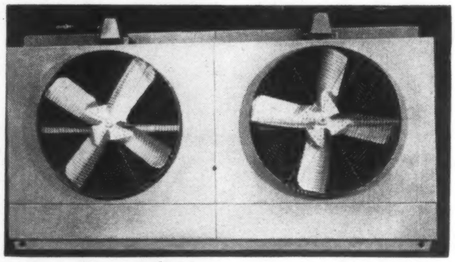


Assures
longer die life,
better threads, big oil savings!

No wonder RIDG-OILR sales have soared . . . it lets you flood your threading dies cool wherever your work is, makes them cut better threads, last longer. Consists of screened chip-pan in circulating oil reservoir with hose-connected hand pump-gun, easy to operate—light to carry. Oil is double strained, used over and over. No messy floors. Quickly pays for itself—buy it at your Supply House!

The Ridge Tool Company • Elyria, Ohio, U.S.A.

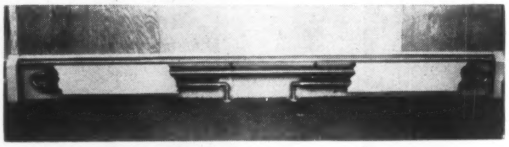
RIDGID
Work-Saver Pipe Tools



Cooling Towers . . .

. . . with twin fans — *Halstead & Mitchell, Dept. HPAC, Bessemer Bldg., Pittsburgh 22.*

Large diameter, four bladed, deep pitch fans of new 80, 100 ton units are belt driven at low speeds by weatherproof, splashproof motors to reduce noise, manufacturer says. Fan bearings lubricated for life; gravity type distributing pans reduce pumping head, cut down windage losses; sump water levels automatically controlled by integral float valves. Steel cabinet, 14 gage, weatherized by applications of "vinsynite," vinyl zinc, chlorinated rubber; wetted deck surfaces are said to resist rotting or damage due to fungus attack.



Baseboard Radiation . . .

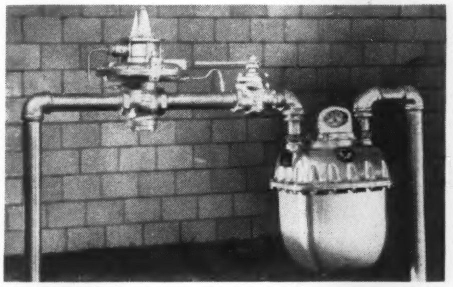
. . . engineered to simplify installation — *Hoff Mfg. Co., Dept. HPAC, Bethany, Conn.*

Radiator panels accommodate either one or two tier fin tube heating elements in one standard panel. New unit may be connected directly to existing hot water supply and return main, manufacturer says. One tier heating elements recommended by company for normal baseboard applications; two tier elements for spaces where heat losses are high, wall space limited.

Water Regulating Valve . . .

. . . for cooling tower service—*Penn Controls, Inc., Dept. HPAC, Goshen, Ind.*

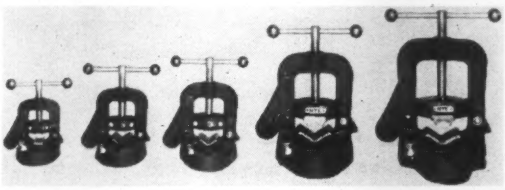
Unit applicable to commercial refrigeration, air conditioning systems which may fall below rated capacities unless head pressure is maintained within reasonable limits, manufacturer says. Three-way action permits water to be diverted from condenser into bypass line to tower nozzles. Available in ½, ¾, 1, 1¼ in. sizes.



Gas Meter . . .

. . .designed primarily for commercial, industrial services requiring large capacity at low working pressure — *Rockwell Mfg. Co., Meter and Valve Div., Dept. HPAC, 400 N. Lexington Ave., Pittsburgh 8.*

Model "750" weighs 47 lb, is easily carried, installed by one man, company says. Has 15 psi working pressure, capacity of 750 cfh at ½ in. differential, 1600 cfh at 2 in. differential. Available with either 45 light steel spud connection or 1½ in. pipe tap connection. Other features cited: side guided, gear driven valves for smooth performance; rigid valve plate measuring mechanism easily removable for maintenance, inspection.



Pipe Vises . . .

. . .with self locking feature — *Nye Tool Co., Dept. HPAC, 4120 W. Fullerton Ave., Chicago 39.*

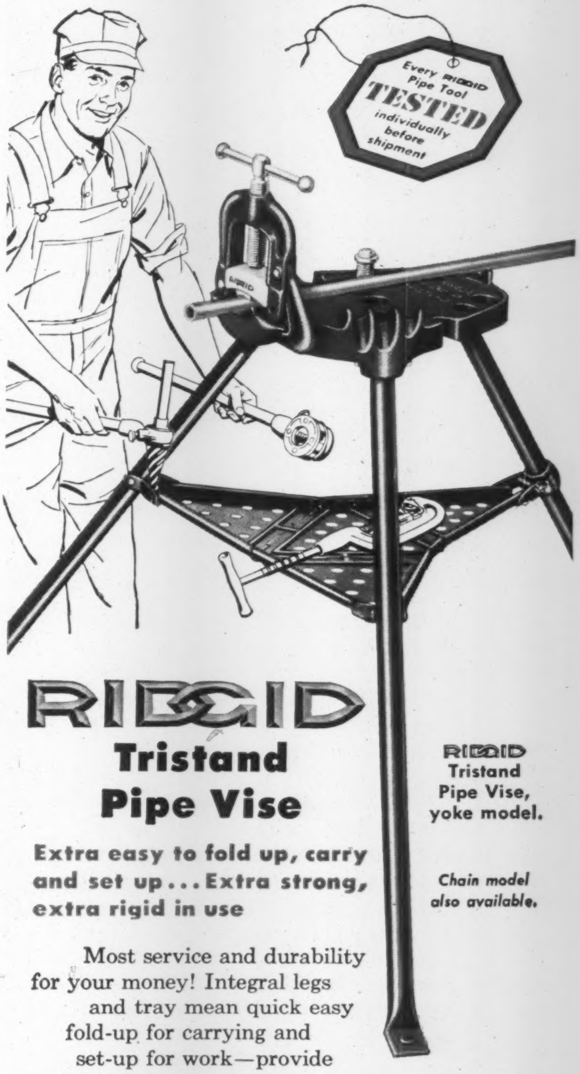
Each unit equipped with replaceable forged steel long jaws that permit working on plated pipe without marring. Has built-in pipe rest, bender as integral part of base. Available in five sizes. NOO ⅛-1½ in., NO ⅛-2 in., N1 ⅛-2½ in., N2 ⅛-3½ in., N3 ⅛-4½ in.

Turbidity Instruments . . .

. . .for monitoring liquids, process dusts — *Ess Instrument Co., Dept. HPAC, 96 S. Washington Ave., Bergenfield, N. J.*

Models include indicators, potentiometer recorders, controls with selective sensitivity and range. Indicator "TM-1" mounted in heavy pressed steel housing for flush mounting. Exterior has red, green limit signals, set by potentiometer at any desired points on scale. Recorder "TIR-6L" housed in heavy steel case, also with signal lights, has rapid traverse 12 in. chart, large indicator pointer.

The stoutest pipe vise . . . . with built-in folding legs and tray



RIDGID
Tristand Pipe Vise

RIDGID Tristand Pipe Vise, yoke model.

Chain model also available.

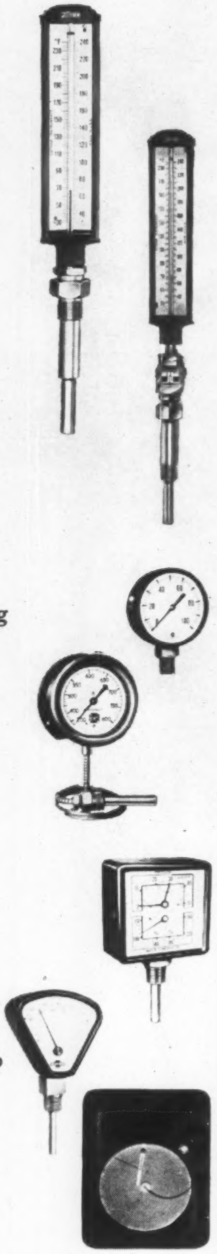
Extra easy to fold up, carry and set up . . . Extra strong, extra rigid in use

Most service and durability for your money! Integral legs and tray mean quick easy fold-up for carrying and set-up for work—provide solid stance, greater strength.

Vise base is roomy, has ceiling brace screw, pipe benders, slots for tools. Special LonGrip jaws grip tight without chewing up pipe. Save work —see it, try it, buy it at your Supply House.

The Ridge Tool Company, Elyria, Ohio, U.S.A.

RIDGID
Work-Saver Pipe Tools



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. . . trademark of DEPENDABILITY for every heating and air conditioning application

To contractors, heating and air conditioning engineers, and equipment manufacturers, the USG trade mark is synonymous with ACCURACY, RUGGEDNESS, DEPENDABILITY.

Contractors will tell you that gauge for gauge—in every application classification—in every price range—you get more value with USG. These qualities, among others, influence more original equipment manufacturers to specify USG than any other make.

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TO EQUIPMENT MANUFACTURERS—For help in keeping your standard gauge and thermometer costs low, or in obtaining special types . . . write either the nearest U. S. Gauge field office or the factory. Our engineering staff and research laboratory are at your service.

USG UNITED STATES GAUGE

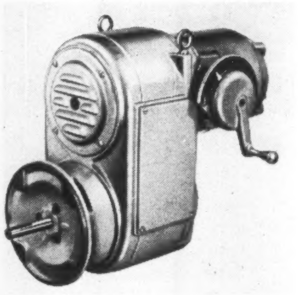
Home of the SUPERGAUGE

Division of American Machine and Metals, Inc.
Sellersville, Pa.

MORE THAN 50,000 TYPES OF GAUGES • SUPERGAUGES • SOLID FRONT GAUGES • RECEIVER GAUGES • TEST GAUGES • RECORDERS • CONTROLLERS • TRANSMITTERS • PSYCHROMETERS • AVIATION INSTRUMENTS

EQUIPMENT DEVELOPMENTS

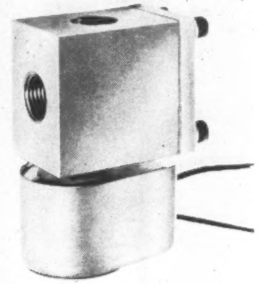
Continued



Variable Speed Motor . . .

. . . designed for quick, accurate alignment to driven equipment — *U. S. Electrical Motors, Inc., Dept. HPAC, 200 E. Slauson, Los Angeles 54.*

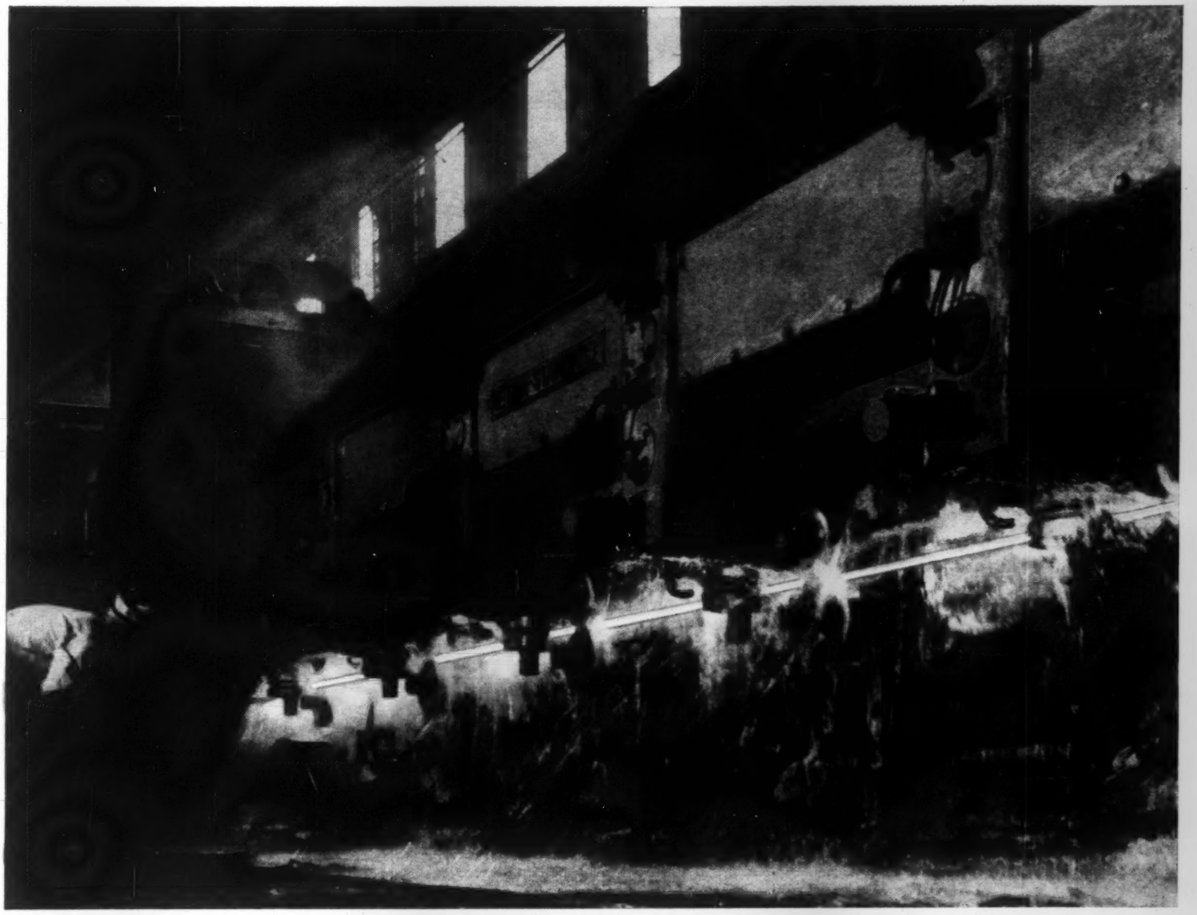
Type "VEV" available from ¼ to 30 hp in ratios to 10:0. Features cited by company: castings normalized under special heat seasoning process to remove internal stresses, prevent distortion; lubrication provides longer bearing life, relubrication without disassembly; windings protected to resist heat, moisture; one piece, double ribbed belt transmits power smoothly and absorbs shock loads, vibration.



Solenoid Valve . . .

. . . for hydraulic applications — *Automatic Switch Co., Dept. HPAC, Florham Park, N. J.*

Units designed for tight shutoff on pressures to 1500 psi. May be mounted in any position without affecting operation, company says. Come in either stainless steel or brass bar stock with teflon discs, stainless steel magnetic parts, in ½ or ¾ in. pipe connections.



At SPANG's Etna Plant, close control of heat, forming and welding conditions builds *top quality* into SPANG CW Steel Pipe.

Here comes your SPANG® CW pipe order at 2,450° F!

Here is the most critical part of the manufacture of SPANG CW Steel Pipe. This is where steel skelp is formed and welded at high speed into a strong quality pipe for dozens of uses.

Three important things happen here to control the quality of the product:

1. **Controlled heat**—To bring the steel skelp to the best temperature—2,450°F—for forming and welding; furnace heat is constantly regulated.

2. **Controlled surface cleaning**—To provide a clean surface on both sides of the skelp, compressed air blows off dirt and scale before forming and welding.

3. **Controlled pressures**—To assure uniformity and provide the best continuous welding results, welding train rolls are carefully positioned at specific settings to give proper pressure for making the weld.

This control is important to you!

SPANG's careful attention to quality control produces for you a *top-quality* pipe that is easy to bend, cut, thread and weld . . . that saves you installation time . . . that offers your customers years of built-in service.

You just can't buy better steel pipe than SPANG CW. If you're not already using SPANG, try it on your next installation and see for yourself. Your nearby SPANG Distributor will be glad to serve you.

SPANG-CHALFANT
DIVISION OF THE NATIONAL SUPPLY COMPANY

SPANG CW STEEL PIPE

General Sales Office: Two Gateway Center, Pittsburgh, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

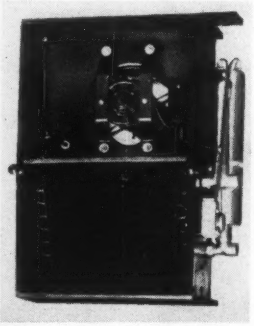
Vibration can't shake it out...
as permanent as the concrete itself

Severest vibrations have no effect on the holding power of a *Red Head* because of its full dovetail expansion. It can't pull out, rust out, melt out or vibrate loose. No expensive drills or explosive charges needed . . . every *Red Head drills its own hole!* Costs less installed than any other type concrete fastener, too. We can demonstrate this at your job site. Write for descriptive, illustrated catalog and free sample

PHILLIPS®
RED HEAD
CONCRETE FASTENER
self-drilling
PHILLIPS DRILL COMPANY, MICHIGAN CITY 5 INDIANA

EQUIPMENT DEVELOPMENTS

Continued



Heating, Cooling Unit . . .

. . . with electric element in each unit — *Electric Heating and Cooling, Inc., Dept. HPAC,* 890-898 *Broadway, Newark* 4, *N. J.*

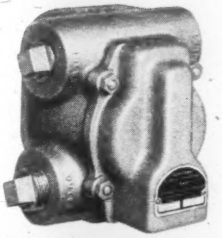
For heating only, each unit of system is complete in itself. When used for both heating and cooling, every unit is connected with common supply of chilled water. As weather becomes cooler, electric "Percojet" heat pump automatically begins operation circulating hot water within each unit. Heating capacity of unit rated to 11,400 Btu per hr at 175 cfm circulating 2 gpm of water at 180 F. For churches, motels, offices, etc.

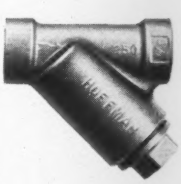
Solenoid Valves . . .

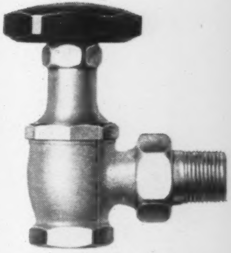
. . . for general industrial applications—*Jackes-Evans Mfg. Co., Controls Div., Dept. HPAC,* 4427 *Geraldine Ave., St. Louis* 15.

Series "J" units designed for flow control of water, air, light oils, brines, low pressure steam, industrial gas, LP gases, other noncorrosive fluids with maximum operating pressure differential of 150 psi. Can be mounted in any position, have only two moving parts, use principle of pilot port operation, company says.

STEAM UNIT HEATER VENTS


FLOAT & THERMOSTATIC TRAPS


"Y" STRAINERS

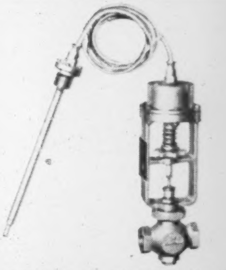

SUPPLY VALVES

HOFFMAN

Complete Line of

Steam Specialties

MAIN VENTS


TEMPERATURE REGULATORS

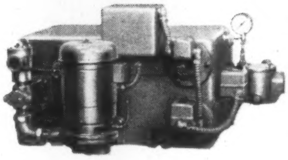
A COMPLETE QUALITY LINE . . .

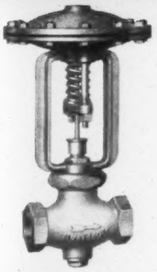
. . . A SINGLE SOURCE OF SUPPLY

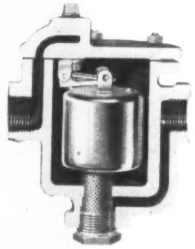
For either one-pipe or two-pipe residential or industrial systems there's a Hoffman Trap, Valve, Pump or other specialty designed to give you better control of every requirement.

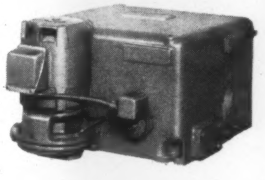
Each Hoffman product is distinguished by exclusive features that assure customer satisfaction and long, trouble-free service. This complete, tested, quality line is backed by a dependable, single source of supply and responsibility.

Write for complete catalog.

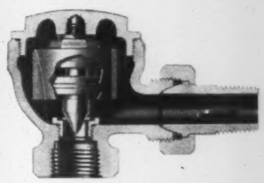

VACUUM PUMPS


PRESSURE REDUCING VALVES


INVERTED BUCKET TRAPS


CONDENSATION PUMPS

VACUUM BREAKER


THERMOSTATIC TRAPS

HOFFMAN SPECIALTY MFG. CORP. 1700 West 10th Street, Indianapolis 7, Indiana

SOLD ONLY THROUGH LEADING WHOLESALERS OF PLUMBING AND HEATING EQUIPMENT

5 Features that give you EVERLASTING valve service

1
Straight through flow . . . minimum pressure drop.

2
Quick acting . . . opened and closed with less than one quarter turn of lever.

3
Self grinding rotating disc . . . assures tight seal.

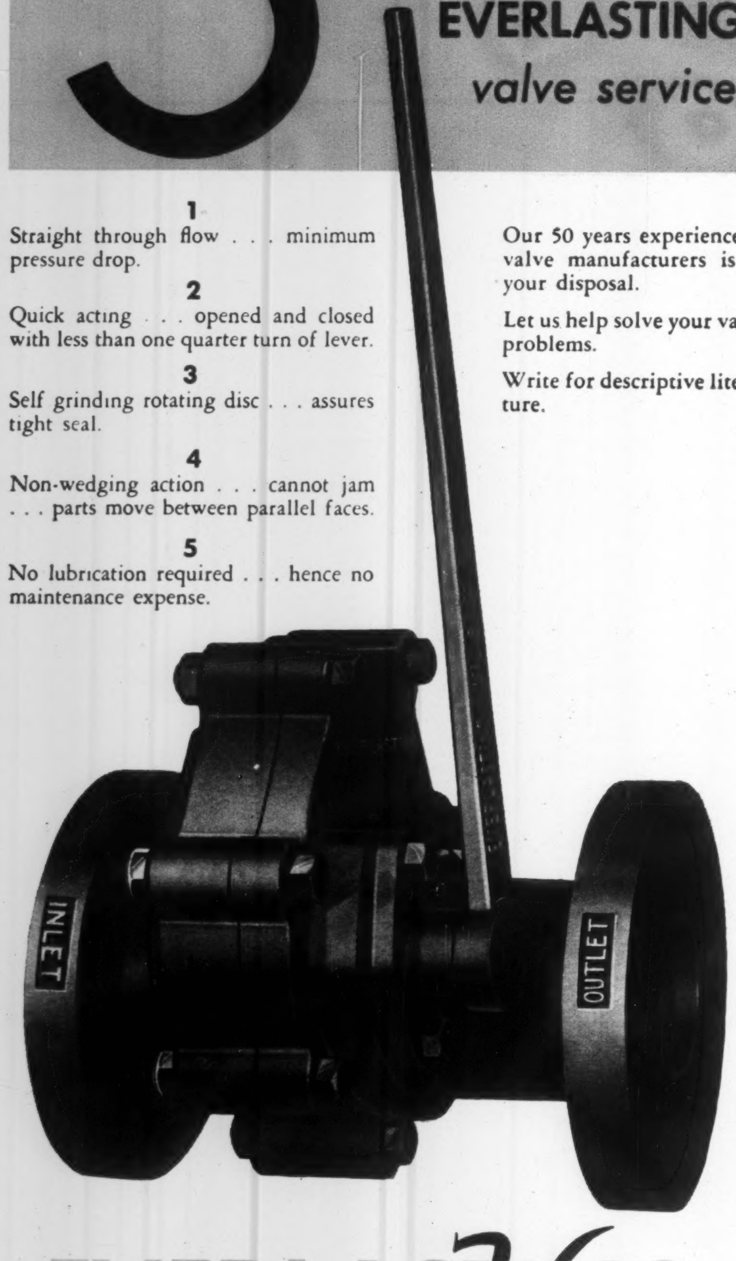
4
Non-wedging action . . . cannot jam . . . parts move between parallel faces.

5
No lubrication required . . . hence no maintenance expense.

Our 50 years experience as valve manufacturers is at your disposal.

Let us help solve your valve problems.

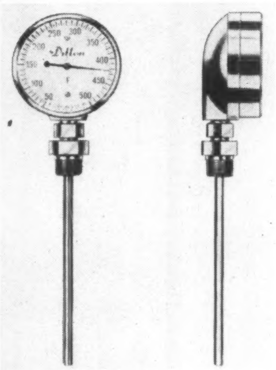
Write for descriptive literature.



EVERLASTING Valves

EVERLASTING VALVE CO.
61 FISK STREET, JERSEY CITY 5, N. J.

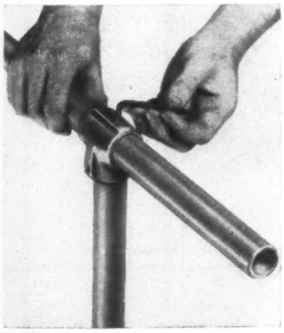
EV-399



Thermometer . . .

. . .designed to make temperature readings easier, more accessible — *W. C. Dillon & Co., Inc., Dept. HPAC, 14620 Keswick St., Van Nuys, Calif.*

Unit has adjustable mounting nut to turn, lock head in position for maximum visibility. Adapted for installation on top of tanks, boilers, in high locations where it would be impractical to utilize standard angle form unit, company says. Available in 3, 5 in. head sizes with stem lengths 2½ to 72 in.

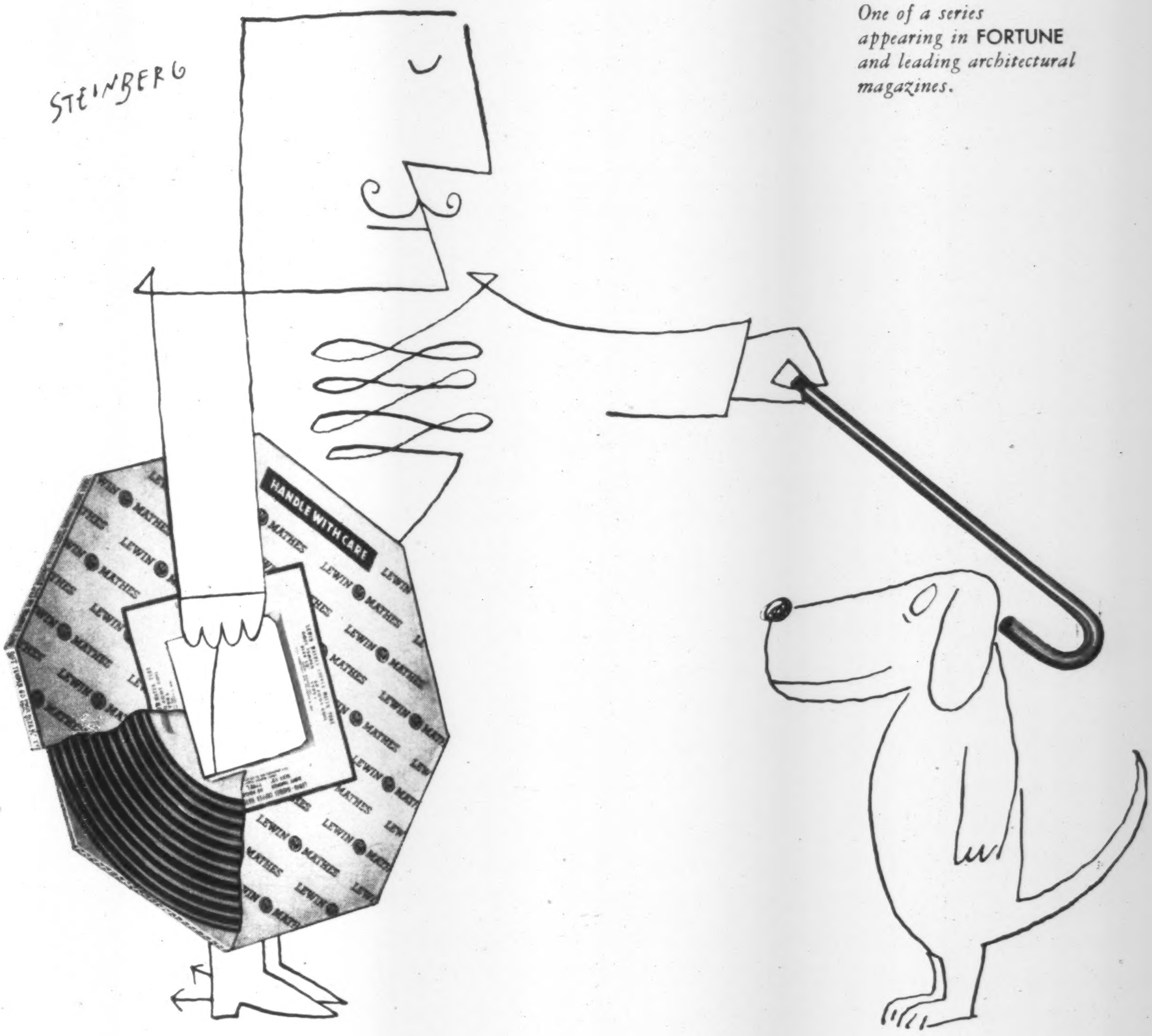


Pipe Fittings . . .

. . .designed for time, labor savings — *Hollaender Mfg. Co., Dept. HPAC, Cincinnati* 23.

By using simple hex, fittings engage pipe by means of knurled hardened point set screws. Fittings gaged to fit standard pipe sizes ¾ to 1½ in. with sufficient clearance to make them adaptable to black, galvanized steel or aluminum pipe, company says.

One of a series appearing in **FORTUNE** *and leading architectural magazines.*



dogmatic

Our plant is an obedience school for Copper.

Here, Copper becomes pure, smooth and submissive . . . meets grueling tests for strength, tolerance and uniformity . . . acquires a high degree of authority as Lewin-Mathes Seamless Tube, Pipe and Rod.

With the dogmatic fervor of the ancient coppersmith, Lewin-Mathes remains the integrated *specialist* in its field. And our pride of product extends to our nationwide service facilities . . . second to none, we believe, in efficiency.

If you use Copper tube or rod in your product . . . or are planning to build . . . ask your designer or architect about Lewin-Mathes quality. It costs no more.

LEWIN MATHES
SAINT LOUIS, MISSOURI
COPPER AND BRASS TUBE PIPE AND ROD
DIVISION OF CERRO DE PASCO CORP.

Cut Steel or Cast Iron Pipe up to 12"

EASIER and FASTER

WITH THE *NEW* REED

HINGED 4-WHEEL PIPE CUTTER

- Closed Frame Construction assures complete rigidity with less weight.
- 4-Wheel design needs minimum swing of handle.
- 4-Point pipe guide aligns cutter for perfect tracking of wheels and a right angle cut.
- Quickly interchangeable wheels for steel or cast iron.
- Needs only 3" space to pass under 12" pipe.

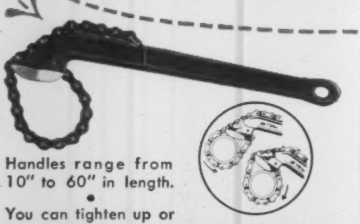
For ditch work or similar close-quarter operations these new Reed Cutters are practically indispensable and fully justify replacing whatever cutting equipment you are now using.

You can, for example, cut 8" steel pipe in less than five minutes, and cast iron pipe even faster.

Available in five sizes for steel or cast iron pipe from 1" to 12".

FOR FAST TURNING IN TIGHT SPOTS—

USE THE IMPROVED REED CHAIN WRENCH



Handles range from 10" to 60" in length.

You can tighten up or "back off" without taking wrench from pipe.

These improved chain wrenches will do anything an ordinary pipe wrench will do . . . and do it easier, better and faster. Ideal for ditches or tight corners.

Grip securely with no play, yet they have a ratchet-like action.

REED

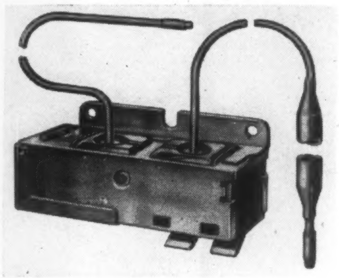
Unconditionally guaranteed to be the most efficient tools you have ever used. See your jobber or write for literature.

REED MANUFACTURING COMPANY

ERIE • PENNSYLVANIA

EQUIPMENT DEVELOPMENTS

Continued



De-icer Control . . .

. . . designed to serve as part of control and valve system offering automatic operation of heat pump—*Ranco, Inc., Dept. HPAC, 601 W. 5th, Columbus, Ohio.*

Unit developed to give positive, reliable, definite de-icing, company says. Operation based upon increases of temperature differential between outside ambient air, outside coil temperature when ice blanket is formed on coil as compared to clear coil. De-icing occurs as sensing bulb, ambient air capillary react to lowered temperature of refrigeration in outside coils and ambient air stream during heating phase. Rocker arm in control opens switch which stops outside fan, causes slide type reversing valve to position for transferring heat from unit to outside coil, company says.

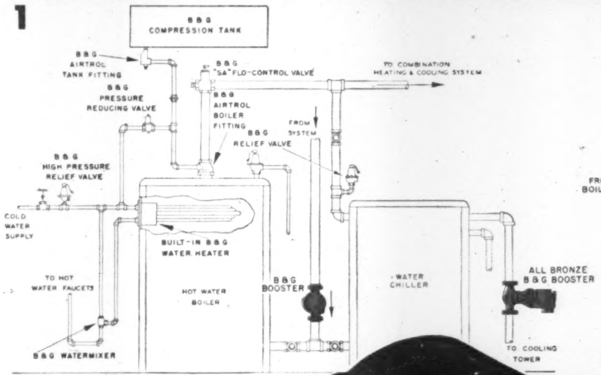
Air Conditioning Units . . .

. . . with 3, 5, 7½, 10, 15 hp ratings for stores — *Drayer-Hanson, Div. of National-U. S. Radiator Corp., Dept. HPAC, 3301 Medford St., Los Angeles 63.*

Single compressors on three models, two compressors on two models. Motors protected by thermal overload elements in automatic starter and by temperature controlled thermal elements on compressors, company says. Primary engineering feature cited is oversize variflow blowers, which operate at extremely low speeds to provide optimum quiet. Range 77 in. high, 38 in. wide, 21½ in. deep to 99 in. high, 86 in. wide, 29 in. deep.

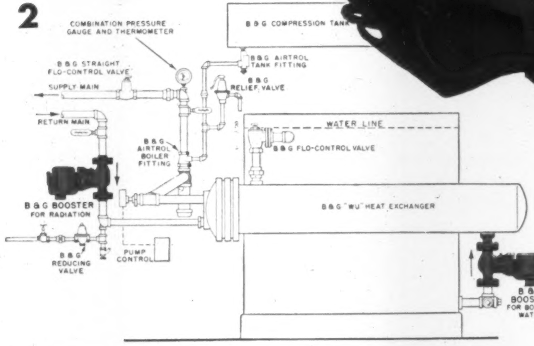
6 WAYS TO MAKE A PROFIT ON B&G BOOSTERS

1


B&G COMPRESSION TANK
B&G AIRTROL TANK FITTING
B&G PRESSURE REDUCING VALVE
B&G "SA" FLO-CONTROL VALVE
B&G AIRTROL BOILER FITTING
B&G RELIEF VALVE
FROM SYSTEM
TO COMBINATION HEATING & COOLING SYSTEM
B&G HIGH PRESSURE RELIEF VALVE
COLD WATER SUPPLY
BUILT-IN B&G WATER HEATER
TO HOT WATER FAUCETS
HOT WATER BOILER
B&G BOOSTER
WATER CHILLER
ALL BRONZE B&G BOOSTER
TO COOLING TOWER
B&G WATERMIXER

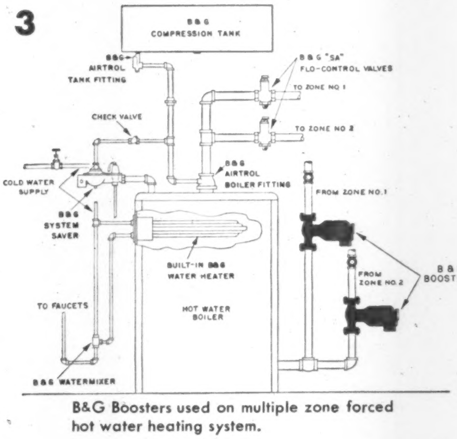
B&G Booster used on combination hot water heating and chilled water cooling system. B&G Booster or Series 1522 Centrifugal Pump can also be used to circulate water from the chiller through the cooling tower.

2


COMBINATION PRESSURE GAUGE AND THERMOMETER
B&G COMPRESSION TANK
B&G STRAIGHT FLO-CONTROL VALVE
B&G AIRTROL TANK FITTING
B&G RELIEF VALVE
SUPPLY MAIN
RETURN MAIN
B&G AIRTROL BOILER FITTING
WATER LINE
B&G FLO-CONTROL VALVE
B&G BOOSTER FOR RADIATION
B&G "WU" HEAT EXCHANGER
B&G REDUCING VALVE
PUMP CONTROL
B&G BOOSTER FOR BOILER WATER

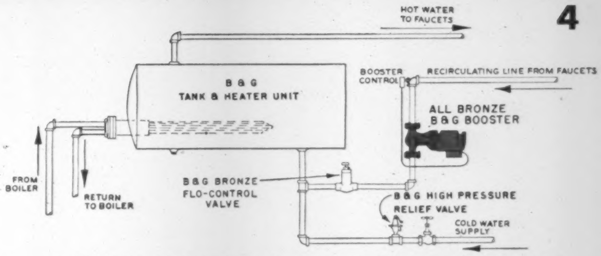
B&G Boosters and "WU" Heat Exchanger provide the means for supplying heat to additional radiators and zones or additional service water heating requirements.

3


B&G COMPRESSION TANK
B&G AIRTROL TANK FITTING
B&G "SA" FLO-CONTROL VALVES
TO ZONE NO 1
CHECK VALVE
TO ZONE NO 2
COLD WATER SUPPLY
B&G AIRTROL BOILER FITTING
FROM ZONE NO.1
B&G SYSTEM SAVER
BUILT-IN B&G WATER HEATER
FROM ZONE NO.2
B&G BOOSTERS
TO FAUCETS
HOT WATER BOILER
B&G WATERMIXER

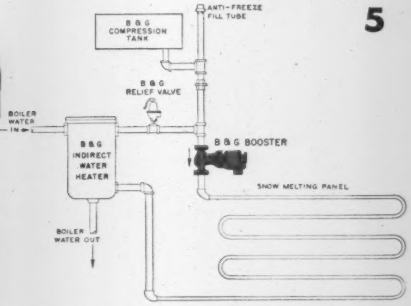
B&G Boosters used on multiple zone forced hot water heating system.

4


HOT WATER TO FAUCETS
B&G TANK & HEATER UNIT
BOOSTER CONTROL
RECIRCULATING LINE FROM FAUCETS
ALL BRONZE B&G BOOSTER
FROM BOILER
RETURN TO BOILER
B&G BRONZE FLO-CONTROL VALVE
B&G HIGH PRESSURE RELIEF VALVE
COLD WATER SUPPLY

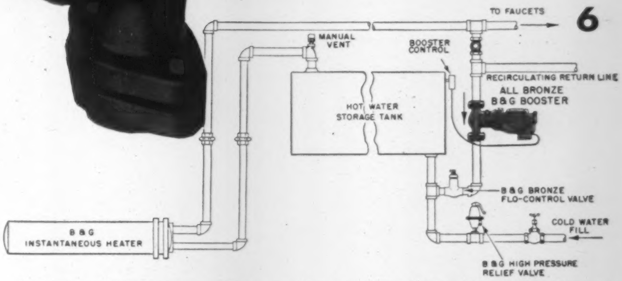
B&G All-Bronze Booster used on recirculating line from hot water faucets maintains hot water at fixtures at all times. Recommended on all installations, particularly those where long plumbing lines are used.

5


ANTI-FREEZE FILL TUBE
B&G COMPRESSION TANK
B&G RELIEF VALVE
BOILER WATER IN
B&G INDIRECT WATER HEATER
B&G BOOSTER
SNOW MELTING PANEL
BOILER WATER OUT

B&G Boosters used to circulate an antifreeze solution through snow and ice melting panels.

6


TO FAUCETS
MANUAL VENT
BOOSTER CONTROL
RECIRCULATING RETURN LINE
ALL BRONZE B&G BOOSTER
HOT WATER STORAGE TANK
B&G BRONZE FLO-CONTROL VALVE
COLD WATER FILL
B&G INSTANTANEOUS HEATER
B&G HIGH PRESSURE RELIEF VALVE

All-bronze B&G Booster used to provide an extra supply of hot water from an undersized boiler. Semi-tankless hook-up maintains initial supply of hot water.

The multiple uses of mechanically circulated water in homes, commercial buildings and industrial plants have made the B&G Booster an outstanding source of profit to contractors.

For new or modernized forced hot water heating systems—for stepping up efficiency in service or process water heating systems, B&G Booster applications are innumerable.

The B&G Booster delivers *greater value*...in *quiet* operation...in failure-proof performance...in long life...all adding up to a solid reputation for dependability. That's why more B&G Boosters are sold than all other similar pumps combined.

BELL & GOSSETT COMPANY

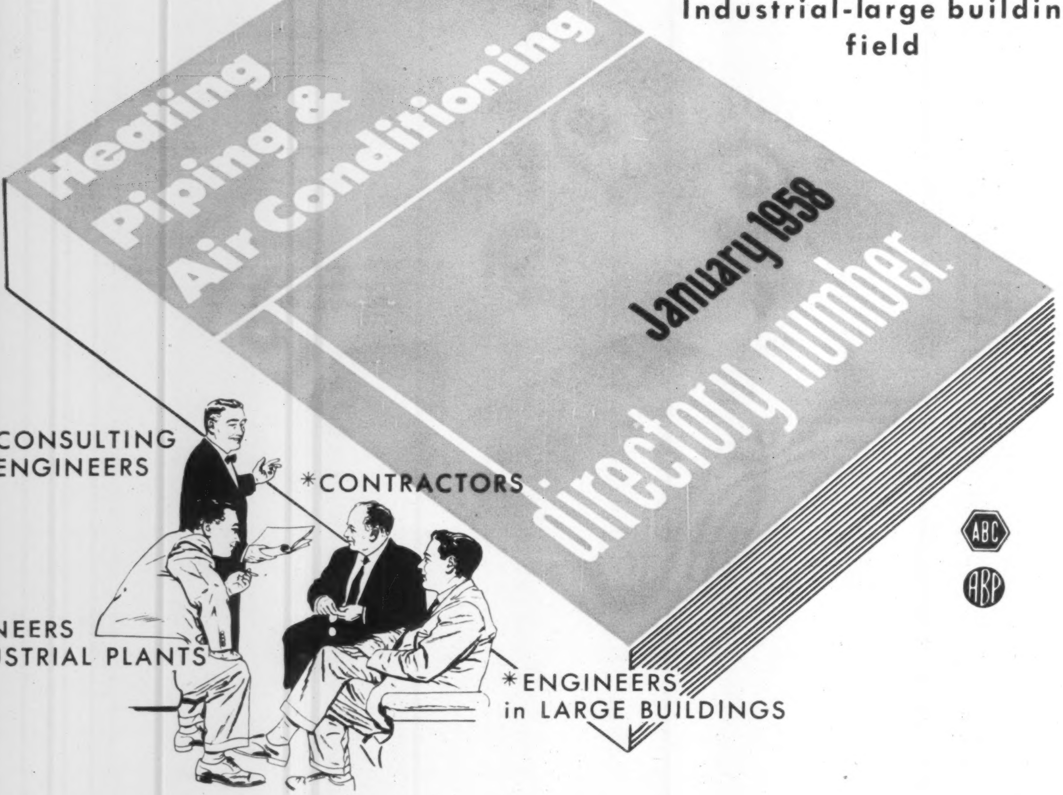
Dept. FA-5 Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd.,
1400 O'Connor Drive, Toronto 16, Ontario, Canada

JANUARY DIRECTORY ISSUE

...the center of attention for those who count

in the
Industrial-large building
field



***CONSULTING ENGINEERS**

***CONTRACTORS**

***ENGINEERS in INDUSTRIAL PLANTS**

***ENGINEERS in LARGE BUILDINGS**

ABC

ABP

Here's where they* go when looking for sources of supply. The January Directory Issue of HEATING, PIPING & AIR CONDITIONING.

How can you be sure? Well, just ask your customers and prospects as we did. 9 out of every 10 of our subscribers (all paid – ABC) report they use this issue when specifying and buying – in many cases as often as every week.

On the right you'll see why. Full of up-to-date, authoritative material, HP & AC's January Directory is the only complete, field-specialized Buyers' Guide to this market.

It makes sense to make capital of such an opportunity. Go "all out." Show your complete line, introduce your 1958 program with a flourish, list your reps, wholesalers, or branch offices. In short, play this issue for all its substantial worth. There's no better place for EXTRA effort – a spread, multiple pages, an insert.

Regular rates apply . . . . . December 10 closing date

Contains

An alphabetical listing of all products used in this field, and manufacturers of each.

•

Names and addresses of all the manufacturers.

•

A listing of all known trade names, cross-referenced.

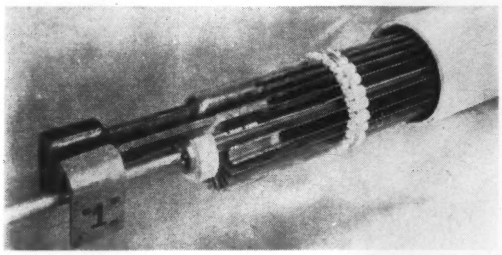
•

A guide to the products advertised in this issue and the manufacturers' names.

•

Normal editorial content of a regular issue – including the official Journal of the ASHAE – plus valuable reference data sheets.

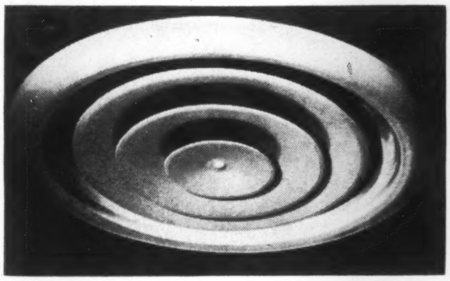
Heating, Piping & Air Conditioning
KEENEY PUBLISHING CO. AIR CONDITIONING HEADQUARTERS
◆
6 N. Michigan, Chicago



Electric Heater . . .

. . .permitting gas to be passed directly over heater element — *Hynes Electric Heating Div., Turbine Equipment Co., Dept. HPAC, Mountainside, N. J.*

"Radi-Fin" designed to attain higher kw ratings without excessive length. Unit has 3 in. wide ribbon formed into v-shape. Twelve formed ribbons mounted radially on high temperature central ceramic held in place by peripheral high temperature ceramics, stainless steel bands. Can be used on three phase power. Heat developed transferred immediately, directly to gas, company says.



Diffuser . . .

. . .with adjustable feature — *Universal Diffuser Corp., Dept. HPAC, 38 Marbledale Rd., Tuckahoe, N. Y.*

Removable core of unit attached to sturdy, hollow brass screw connected to the installation spider. By rotating lower blade, core can be raised or lowered to change air flow from horizontal pattern through any angle to vertically down, company says. Core is removable by holding one of larger cones and turning it. Available in sizes 6 to 36 in.

Air Duct Calculator . . .

. . .for sizing by velocity reduction or equal pressure loss methods — *Paul S. Morton Engineering Service, Dept. HPAC,* 5131 *Meadowlark Ln., Kalamazoo, Mich.*

Cfm, velocities, friction losses, weight of ducts, equivalent round and rectangular ducts can be determined with unit, manufacturer says.

ACCEPTED
Allen
ROOF VENTILATION

Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.

NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.

POWERFUL "VD" for HIGH VELOCITY

By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

. . . is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

WIND-DRIVEN TURBINES

Three types of Allen turbines take full advantage of the economy of natural air movement.

EXHAUST FANS

Remote drive Staxauster is designed to handle corrosive fumes, and/or high temperature air.

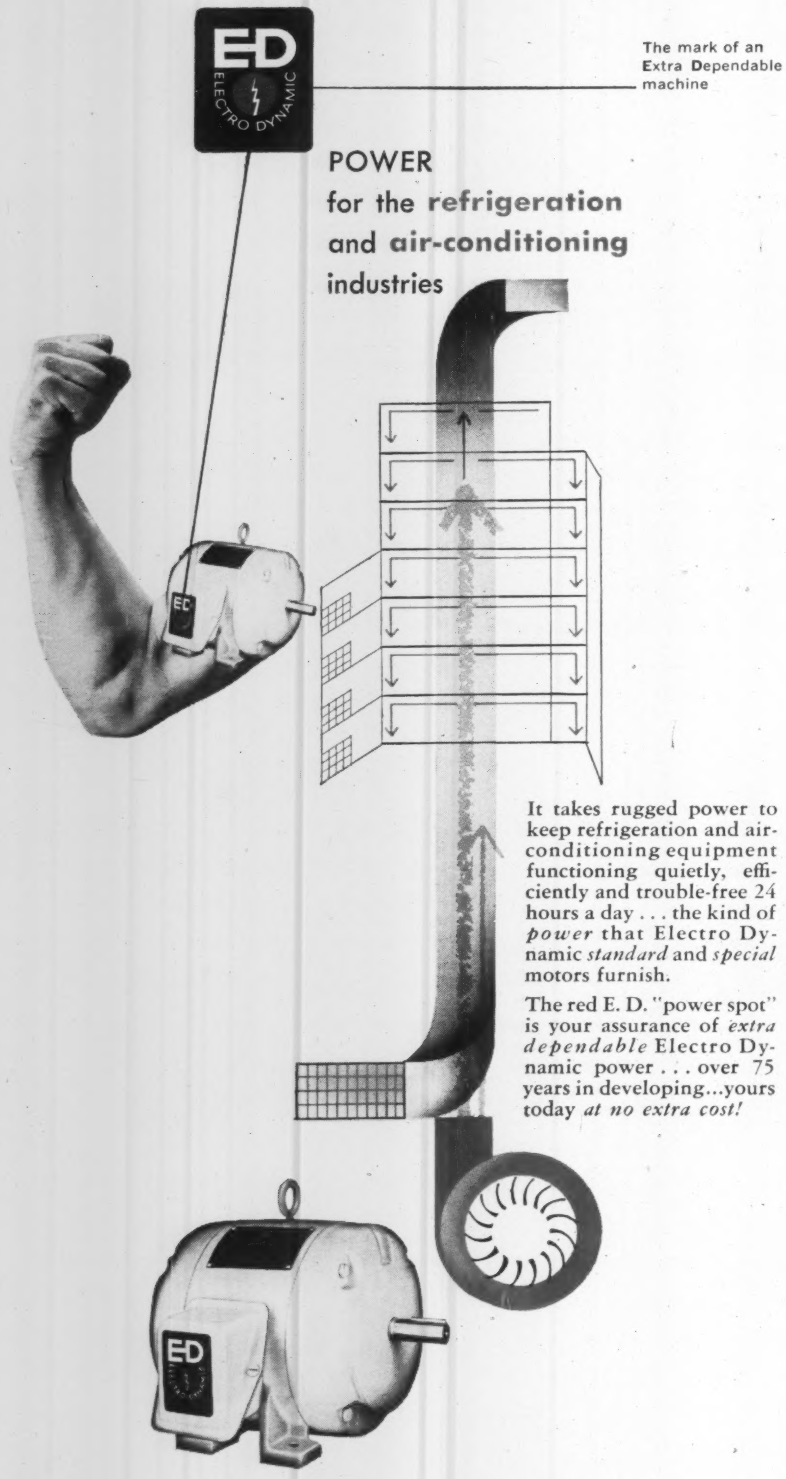
THE ALLEN LINE

Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

ALLEN ENGINEERED VENTILATION

ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, MICH.

Roof Ventilators for Every Commercial and Industrial Need
REPRESENTATIVES IN PRINCIPAL CITIES



The mark of an
Extra Dependable
machine

POWER
for the **refrigeration**
and **air-conditioning**
industries

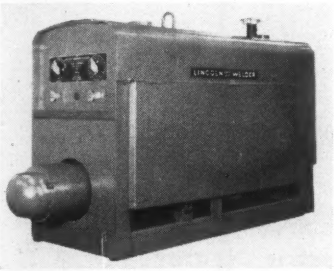
It takes rugged power to keep refrigeration and air-conditioning equipment functioning quietly, efficiently and trouble-free 24 hours a day . . . the kind of *power* that Electro Dynamic *standard* and *special* motors furnish.

The red E. D. "power spot" is your assurance of *extra dependable* Electro Dynamic power . . . over 75 years in developing...yours today *at no extra cost!*

E-D ELECTRO DYNAMIC
DIVISION OF GENERAL DYNAMICS
CORPORATION
BAYONNE, NEW JERSEY
GD GENERAL DYNAMICS

EQUIPMENT DEVELOPMENTS

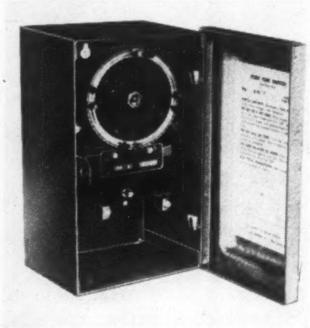
Continued



Portable Arc Welder . . .

. . . rated 200 amp at 40 volts, 60 percent duty cycle — *Lincoln Electric Co., Dept. HPAC, 22801 St. Clair Ave., Cleveland* 17.

Unit powered by 36 hp gasoline engine. Five step selective current control, continuous voltage control which provides fine adjustments in current included. Idling device reduces engine speed to 1000 rpm when welder not in use. Large 16 gal gasoline tank operates unit for 14 hr at 60 percent duty cycle without refilling, manufacturer says.



Time Switch . . .

. . . designed for use on heavy oil or coal stoker installations — *Tork Time Controls, Inc., Dept. HPAC, Mount Vernon, N. Y.*

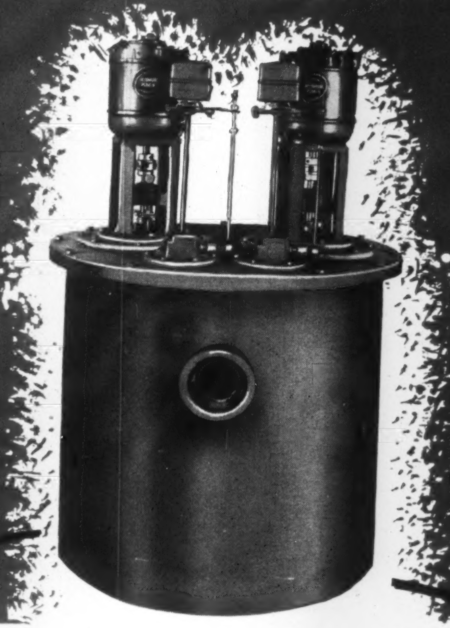
"Model 6191" is fast dial time control providing one or more *on* and *off* periods every hour automatically. In heavy oil installations, short hourly warmup periods during night shutdown period preheat heavy oil, assure quick morning startup, company says. In coal stoker installations, *on* action serves as holdfire, maintaining a fire bed throughout night.

Skidmore

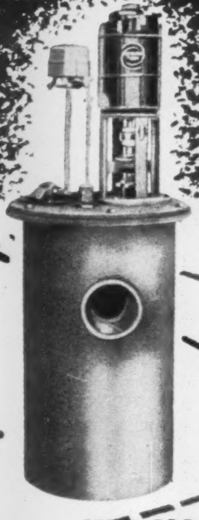
. . . the PUMP that offers CUSTOM DESIGN — at a "standard price"

Built to match your exacting conditions . . . inexpensive to install . . . inexpensive to operate . . . inexpensive to maintain.

There's a Skidmore Heating Pump for that unusual condition—for that below level return—for that low return system or low and high pressure requirements. Advance design and engineering principles built into every Skidmore Pump will give "year-ahead" dependability and trouble free service on every job.



duplex unit



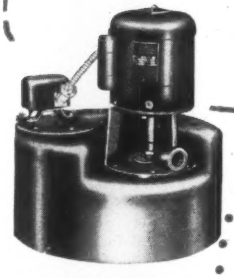
single unit

"UV" CONDENSATE PUMP

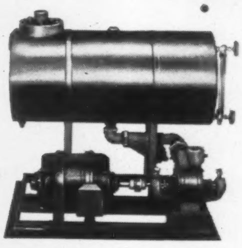
Compact, vertical type pump . . . consists of motor unit and float switch mechanism bolted to sump type receiver. Designed for below floor level return.

Capacities—2,000 to 40,000 EDR.
Pressures—10 to 75 lbs.

SEND FOR BULLETIN No. 19-A



TYPE "CVS" CONDENSATE Capacities — 500 to 10,000 EDR. Pressures — 10 to 40 lbs.



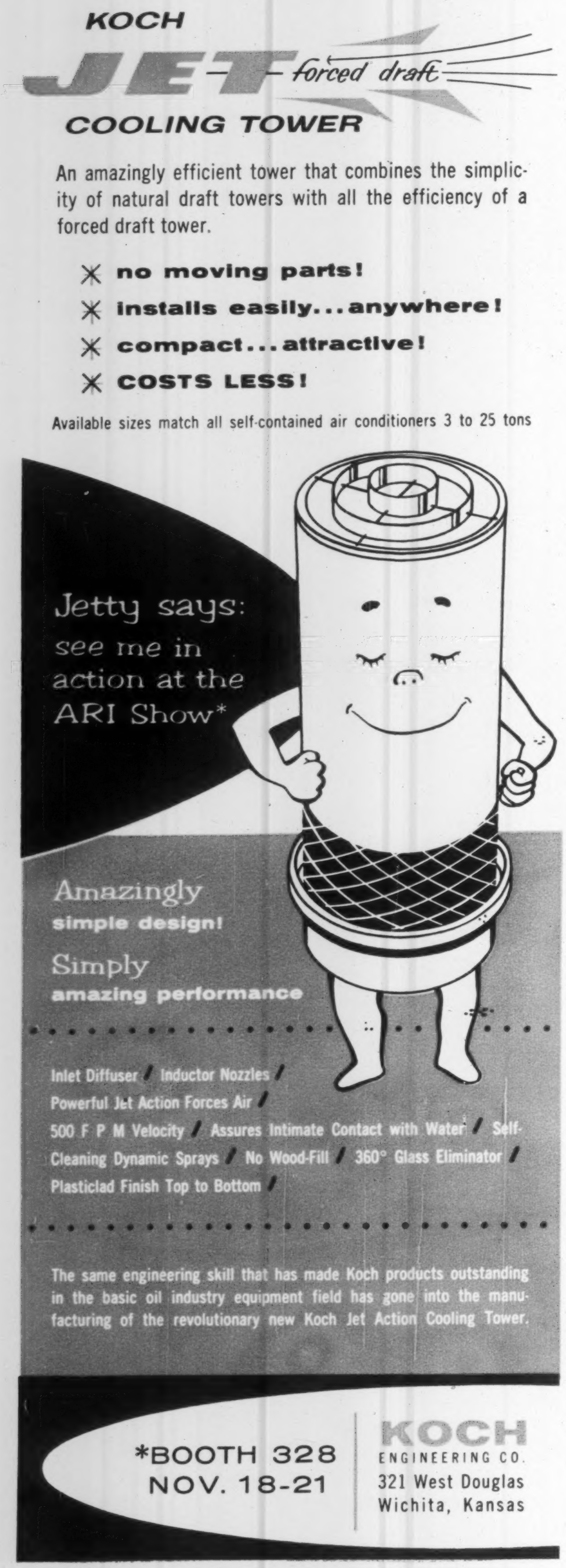
TYPE "TM" TURBINE. Capacities — boilers up to 250 H.P. Pressures up to 150 lbs.

There's a Skidmore Pump built for every heating requirement.

SKIDMORE PUMPS

SKIDMORE CORPORATION

ST. JOSEPH, MICH.


KOCH
JET forced draft
COOLING TOWER

An amazingly efficient tower that combines the simplicity of natural draft towers with all the efficiency of a forced draft tower.

- no moving parts!
- installs easily...anywhere!
- compact...attractive!
- COSTS LESS!

Available sizes match all self-contained air conditioners 3 to 25 tons

Jetty says: see me in action at the ARI Show*

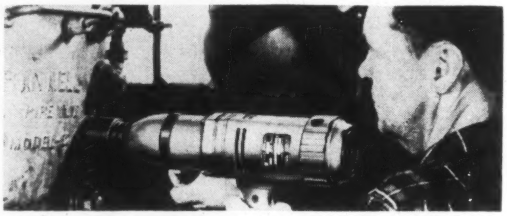
Amazingly simple design!
Simply amazing performance

Inlet Diffuser / Inductor Nozzles / Powerful Jet Action Forces Air / 500 F P M Velocity / Assures Intimate Contact with Water / Self-Cleaning Dynamic Sprays / No Wood-Fill / 360° Glass Eliminator / Plasticlad Finish Top to Bottom /

The same engineering skill that has made Koch products outstanding in the basic oil industry equipment field has gone into the manufacturing of the revolutionary new Koch Jet Action Cooling Tower.

*BOOTH 328
NOV. 18-21

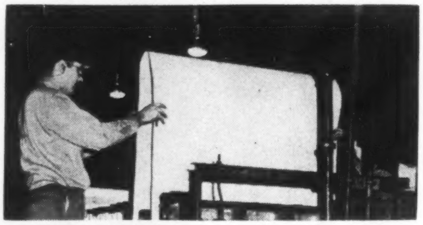
KOCH
ENGINEERING CO.
321 West Douglas
Wichita, Kansas



Impact Wrench . . .

. . . with torque range of 300-450 ft lbs — *Black & Decker Mfg. Co., Dept. HPAC, Townson 4, Md.*

"No. 300" unit has die cast aluminum housing, lubricant sealed ball bearings, heat treated gears. Designed for large, heavy nut running from $\frac{7}{8}$ in. diameter, for cap and lag screw driving, removal. Features cited: adjustable auxiliary handle for better operating balance; positive control reversing switch; instant release trigger switch for power control.



Filter Fabrics . . .

. . . for chemical filtration — *Union Carbide Chemicals Co., Div. of Union Carbide Corp., Textile Fibers Dept., Dept. HPAC, 30 E. 42nd St., New York 17.*

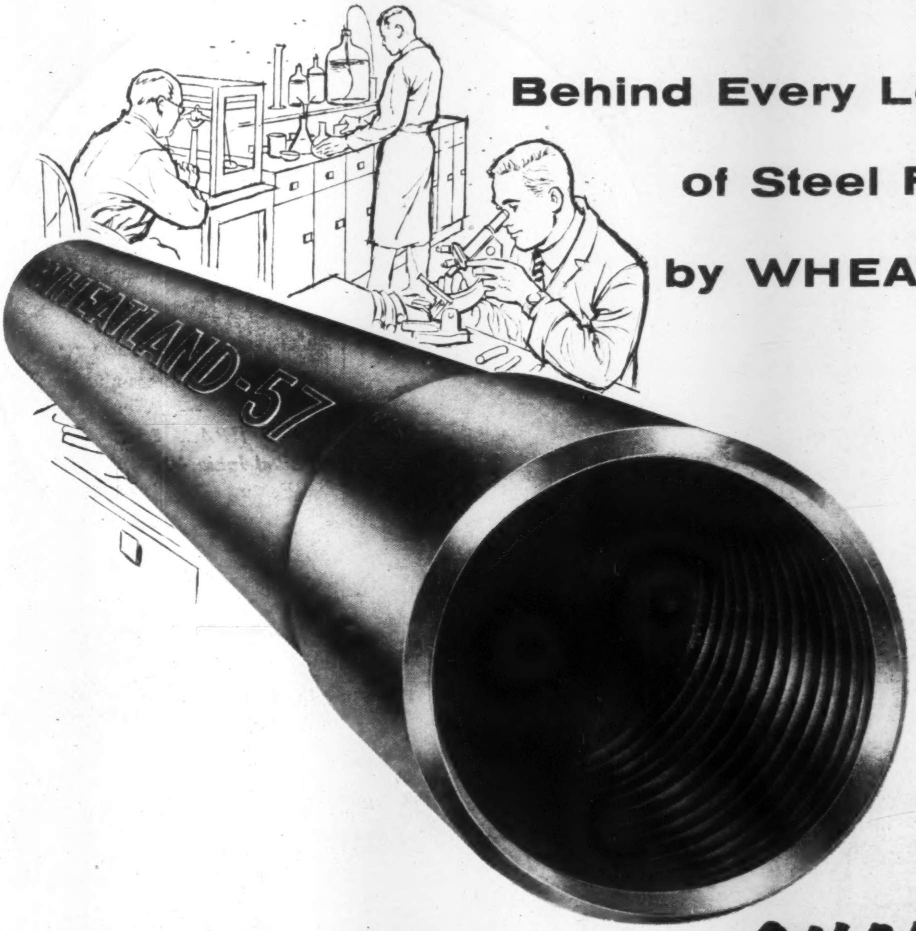
Nonwoven felt used as covering for filter cloth in plate and frame filter presses. Material, a high density matting of acrylic fiber, acts as efficient gasket to reduce plate leakage, prevent rim cutting, manufacturer says. Resistant to most chemicals, including acids, bases, oxidizing agents, solvents.

Valve Discs . . .

. . . designed to allow valves to operate in high service brackets — *Kennedy Valve Mfg. Co., Dept. HPAC, Elmira, N. Y.*

New process deposits hard, tough chromium alloy with hardness of 70 Rockwell C on disc face. Low coefficient of friction results and valve seat in service becomes progressively more highly polished instead of galling, manufacturer says. In tests with discs, valves have completed more than 15,000 cycles of operation at 18 ft lb closing torque without any sign of failure, according to company. Available for 125, 200, 300 lb steam rating.

Behind Every Length of Steel Pipe by WHEATLAND



CONTINUOUS INSPECTION for *QUALITY*

At regular intervals during fabrication, sample pieces of Wheatland Steel Pipe are carefully inspected for quality. This is just one reason why you can recommend and use this fine product with complete confidence. There are other reasons, too . . .

- **Skilled, experienced craftsmen**
- **Rigid pressure-testing**
- **Strict supervision of all phases of production**
- **A trained sales organization**
- **A reputation for quality and service built by the caliber of Wheatland Distributors**
- **The Wheatland Yearmark—lasting reminder of our pride and integrity**

For information about Black or Galvanized Steel Pipe, contact

WHEATLAND TUBE COMPANY

BANKERS SECURITIES BUILDING, PHILADELPHIA 7, PA.
MILLS: WHEATLAND, PA. • DELAIR, N. J.

**CONFESSIONS OF A
HEATING CONTRACTOR**

Built-up boilers used to bog me down in a pile of parts. Fuss and cuss all the time! Assembly — what a headache! Completing a manufacturer's job on my time, on my own money.

Then happy day! I discovered Progress —Progress packaged boiler, I mean. No more bogging down with built-up boilers. One source . . . one responsibility. A complete, ready-to-operate boiler delivered to the job. Saves up to two full days' installation time. Progress boilers are full-fire factory tested. Field starting service costs me nothing and my customers are 100% satisfied.

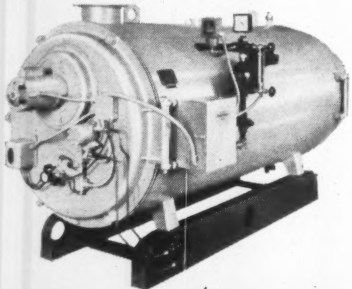
moral:

To make progress . . .

SELL *Progress*--

Heating wholesalers coast to coast are now delivering 7 sizes to 2,010,000 Btu. This complete range covers *all types* of commercial heating needs. Oil, gas and combination oil/gas fired models for greatest fuel economy. To make profits and progress in your business — sell Progress — America's leading boiler value!

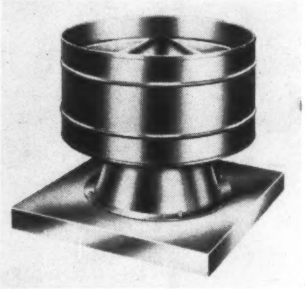
*See your nearest
qualified cooperative
wholesaler NOW, or write:*
CLEAVER-BROOKS COMPANY
Dept. M, 313 E. Keefe Ave.,
Milwaukee 12, Wisconsin



Cleaver-Brooks
Progress
Packaged Boiler

Cleaver Brooks

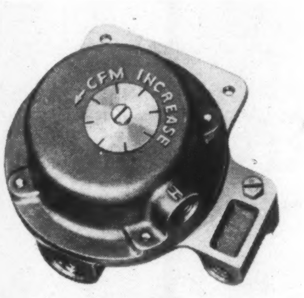
*Built exclusively for commercial heating by
Cleaver-Brooks — originators of self-contained boilers.*



Ventilator Base . . .

. . . for small square and round transition bases — *Penn Ventilator Co., Dept. HPAC,* 3252 *Goodman St., Philadelphia* 40.

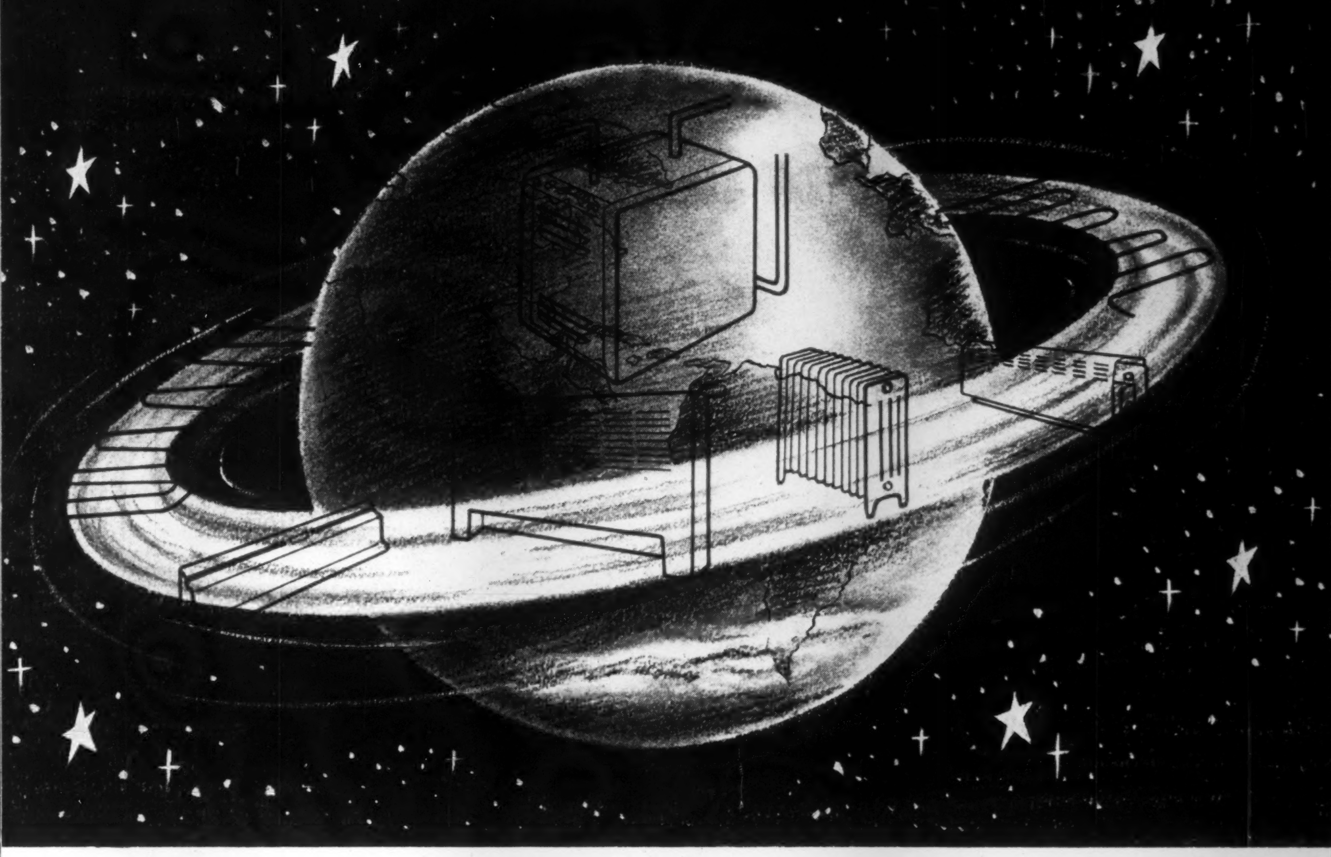
Features cited by company: one piece seamless weather tight transition; rustproof aluminum material; heavy 16 gage construction; built-in condensation gutter; proper tapered proportion. Top assembly removed easily, quick access to control accessories provided, manufacturer says.



Volume Control . . .

. . . for mixing units used on high velocity, high pressure, double duct air conditioning systems — *Johnson Service Co., Dept. HPAC,* 507 *E. Michigan St., Milwaukee* 1.

"R-316" air flow controller provides constant volume air distribution through every unit of system, maintaining constant flow pattern within each conditioned space, company says. Operation effective at any pressure difference 0 to 1 in. water gage, produces 1 psi pneumatic pressure change on pressure differences of less than 0.005 in. water gage.



There is also a wonderful world of ~~thermo-dynamics!~~ "Hydronics"!*

An automobile ad entreats its readers to "Step into a wonderful world of auto-dynamics!" Their world is all they say it is: wonderful . . . and nothing in it is more "dynamic" than the words they use to describe it. Designs are "glamorous", "glittering", "flight-styled", "exciting." Controls are "feather-touch" or lighter! Engines are "Furies", "Stratostreaks", "Rockets" that release their "hurricanes of power"!

Yes, the great strides of the automotive industry probably justify any extravagance of description. But . . . *please* . . . what about the equally great strides of the industry *you* are dedicated to—the heating industry? There is also a wonderful world of *thermo-dynamics!** "Hydronics"*

You well know the recent miracles performed in *that* world. You know that boiler heat, distributed by radiant panels, baseboard units, convectors and modern radiators is the smoothest, most adaptable, most controllable, most economical form of space heating ever known to man.

By introducing heat in its best form—largely radiant form—boiler heat achieves the basic prerequisite of comfort: gentle warming of walls, floors, ceilings. It meets the cold where the cold comes in, as no other system can.

Modulated by modern controls, boiler heat gives an all-encompassing, all-pervading comfort that no other system can rival. Quiet as a moonbeam, it never blasts or calls attention to itself, yet it is always right there with you. Never "all off" or "all on", it provides its even, hold-over flow of cradling warmth that gives the smooth ride even in the bumpiest winter weather . . . does it with the absolute minimum of fuel. It is heat to warm a man's body, heart and soul!

With sturdy, life-time units, boiler heat is the life-time investment. In all deference to the fish-tailed beauties in the garage, heating is still the biggest thing in the home owner's life—day and night for about 200 days of the year.

Let's take our cue from other great industries and quit being so doggone modest in presenting the story of boiler heat. It *is* big. Let's *think* it big . . . *talk* it big . . . *make* it big!

* "Hydronics" is a coined word recently adopted by members of the Institute of Boiler and Radiator Manufacturers to quickly tell the wonderful story of liquid heating and cooling. Its root word, "hydro", is from the Greek word for water, and the second part of the coinage connotes action.

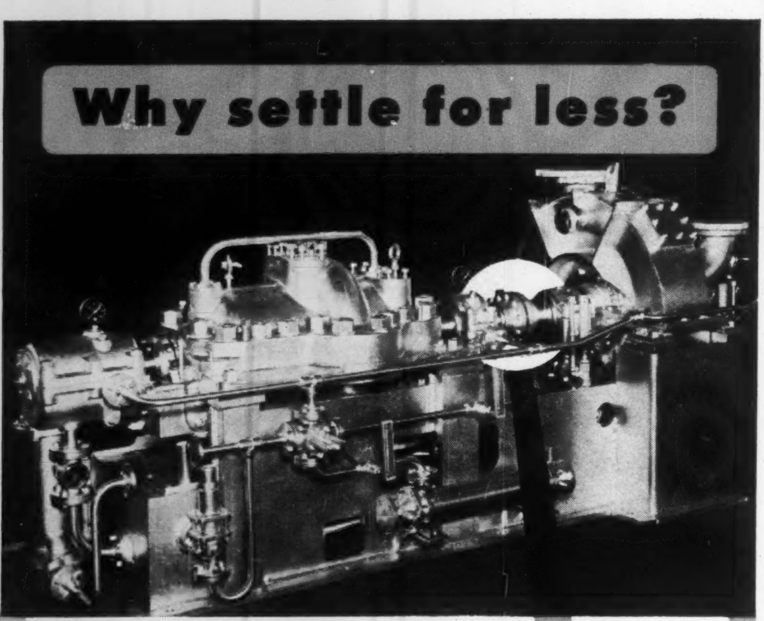
McDonnell & Miller, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

SAFETY CONTROLS

McDONNELL Boiler Water Level Controls and Safety Devices

Why settle for less?



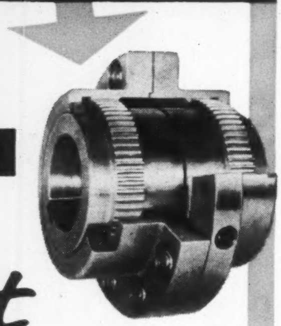
Waldron coupling on turbine driven feedwater pump

by specifying

WALDRON

Gear Couplings

you get



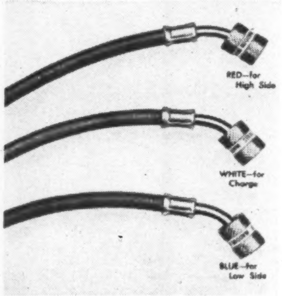
STRENGTH —Hubs and cover sleeves for sizes 1¼A through 7A are machined from tough steel forgings. Hubs are keyed to the shafts. The two one-piece cover sleeves function as a single, rigid unit serving as a floating connecting link between the hubs. High strength of forgings makes possible a very compact coupling with low rotating inertia.

RELIABILITY —There are no flexible parts to bend or break and the coupling is dust, moisture, and oil tight. Patented Walflex seal is positioned where centrifugal force is least. Clearance between teeth in hubs and sleeve is engineered so that an oil wedge always separates them, taking the wear.

SERVICE —Plenty of rough bore couplings, already assembled—on the shelf for *immediate* delivery. Finish bored standard couplings shipped to meet customers' schedules. We are geared up to give you realistic delivery on *any* type of couplings.

▶ Ask for Catalog 57

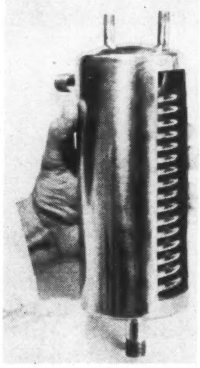
JOHN **WALDRON** CORP.
NEW BRUNSWICK, NEW JERSEY
Representatives In Principal Cities



Charging Lines . . .

. . . with color codes — *Madden Brass Products Co., Dept. HPAC, Aurora, Ill.*

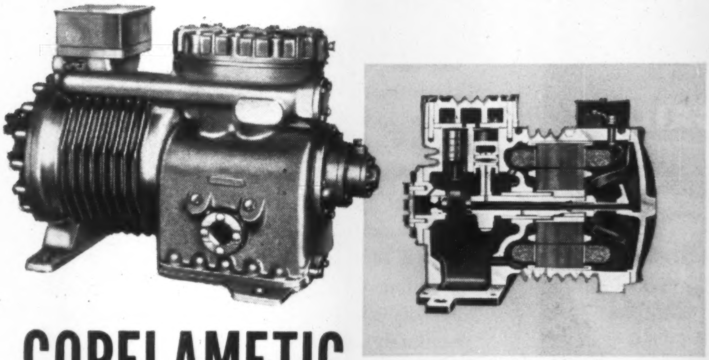
Colors used are red for high side, white for charge, blue for low side. Features of lines cited by company include flexibility; all brass barb and ferrule for positive seal; tubular gasket that will not pop out; finger grip knurled nut for easier handling.



Liquid Sample Cooler . . .

. . . designed to operate with pressures to 5000 psig, temperatures to 1200 F — *Carpenter Steel Co., Alloy Tube Div., Dept. HPAC, Union, N. J.*

Unit is shell and tubular coil type heat exchanger applicable to feedwater heaters, hot water softeners, high and low pressure boilers in power plants. Suitable for cooling samples in chemical, refinery, paper, laboratory processes. Housed in stainless steel shell 3½ in. in diameter by 11¼ in. long. Sample pipe, circulating water connections made externally to avoid possibility of sample contamination from leaky joints, fittings, manufacturer says.



COPELAMETIC

THE *Accessible* HERMETIC

You can get to direct-drive Copelametic units effortlessly...in a jiffy. No belts or seals, no manual oiling. 90% of service costs eliminated. Models for all applications—air-cooled—from ⅓ through 5 H.P. Water-cooled ⅓ H. P. through 10 H.P.

CopeLand
DEPENDABLE REFRIGERATION
COPELMETIC
BELT-DRIVEN
COPELAWELD
REFRIGERATION CORP.
SIDNEY, OHIO

the easy way to solve a tough problem

So you have a reputation to maintain for high-quality installations in the air-conditioning and refrigeration fields.

And you have worries. You must meet and beat competition. The quality and performance of what you get from your suppliers are a constant concern.

That's the perfect time to make sure there's a Copeland motor-compressor or condensing unit in every piece of equipment you install. For Copeland units are masterfully designed, painstakingly built, are standard with leading manufacturers. Now they're streaming from our spanking-new plant—270,000 square feet of America's most modern manufacturing facilities.

LIVE BETTER ELECTRICALLY

MANUFACTURERS OF THE HEART OF AMERICA'S FINEST AIR CONDITIONING AND COMMERCIAL REFRIGERATION UNITS

SINCE 1918

Copeland REFRIGERATION *CORPORATION, Sidney, Ohio*

For Commercial Installations

"Fabrikated" ®
WALL GRILLES
MADE TO ORDER IN SPECIAL LARGE SIZES
No. 311D WALL GRILLE

Independent famous "Fabrikated" construction makes these grilles especially adaptable to large sizes for schools, hospitals, hotels, and other commercial buildings.

CHECK THESE FEATURES!

- ✓ Vertical or horizontal bars strengthened by interlocking cross bars; no vibration.
- ✓ Tamper-proof. Changes in air distribution cannot be made by unauthorized persons.
- ✓ Mesh (⅜ x 1 11/16) filters 72% of free area yet darkens the duct and reduces highlights from back of the grille.
- ✓ 14 gauge steel solid bars ½" deep—strong enough to be "kick-proof"—(a must for schools).
- ✓ All bars made from round edge stock. No sharp edges. (A must for schools).
- ✓ The only grille for taking abuse in school gyms and hospital psychopathic wards.

These grilles are unusually rigid-strong and exceedingly resistant to impact—the best that money can buy. We make them in any size. Send your specifications. We are prepared to give immediate service because we always stock grille parts for any size.

THE INDEPENDENT REGISTER CO.
3747 E. 93rd STREET • CLEVELAND, OHIO

EQUIPMENT DEVELOPMENTS

Continued

Boiler Cleaner . . .

. . .designed for removing accumulated dirt, rust, sludge, other foreign matter and for sealing leaks — *J. A. Sexauer Mfg. Co., Dept. HPAC,* 2503-05 *Third Ave., New York* 51.

"Heat Pump" cleaner loosens core sand, oil, other dirt common to new boilers; removes accumulation of rust, other impurities from old boilers. Sealing compound mixes readily with boiler water, quickly works its way directly to any leak and seals it almost immediately, manufacturer says.

Air Conditioner . . .

. . .of compact design — *Lewyt Air Conditioner Corp., Dept. HPAC,* 43-22 *Queens St., Long Island City* 1, *N. Y.*

One ton unit is 15 in. deep, 14⅝ in. high, 32 7/16 in. wide. Engineered for through-the-wall installation. Small size allows it to be used with convector heating, manufacturer says.

Stud Driving Tool . . .

. . .designed to stop alloy steel fastener when fired mistakenly into soft construction material — *Remington Arms Co., Inc., Dept. HPAC, Bridgeport, Conn.*

Tool, powered by 22 caliber blank cartridge, can anchor wood to steel or concrete, wood or steel to steel, or threaded fasteners directly into steel or concrete, manufacturer says. Safety features augmented by new emergency arresting device in guard assembly.

Clutch Assembly . . .

. . .designed for industrial applications—*Bendix Aviation Corp., Dept. HPAC,* 30 *Rockefeller Plaza, New York.*

Unit features minimum amount of overrunning friction due to centrifugal action, manufacturer says. Used to transmit power from starter to motor or engine; can be applied to dual engine driven generators, water pumps, similar equipment.

Thermostatic Valve . . .

. . .designed to resist pressure changes — *Lawler Automatic Controls, Inc., Dept. HPAC, Mount Vernon, New York.*

Pressure balanced seat construction provides positive closing of both seats regardless of high water pressures acting against them, company says. Unit is piston type, automatically regulates water flowing through it thermostatically. Available in 2 in. and larger sizes.

UNITED-FIN TUBE

Temper . . . tuned to the task
Surface . . . clean as you ask

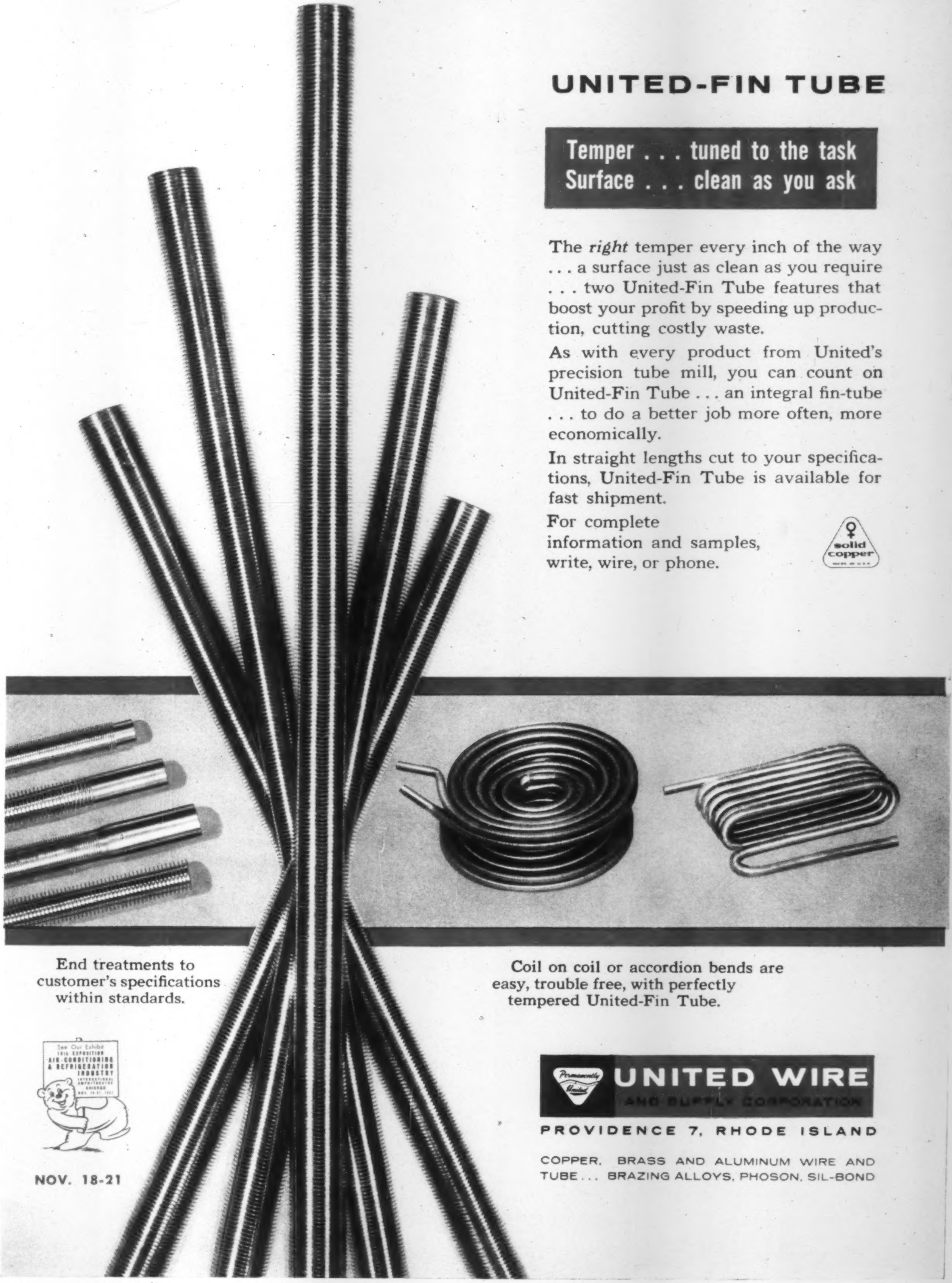
The *right* temper every inch of the way . . . a surface just as clean as you require . . . two United-Fin Tube features that boost your profit by speeding up production, cutting costly waste.

As with every product from United's precision tube mill, you can count on United-Fin Tube . . . an integral fin-tube . . . to do a better job more often, more economically.

In straight lengths cut to your specifications, United-Fin Tube is available for fast shipment.

For complete information and samples, write, wire, or phone.

solid copper



End treatments to customer's specifications within standards.

Coil on coil or accordion bends are easy, trouble free, with perfectly tempered United-Fin Tube.

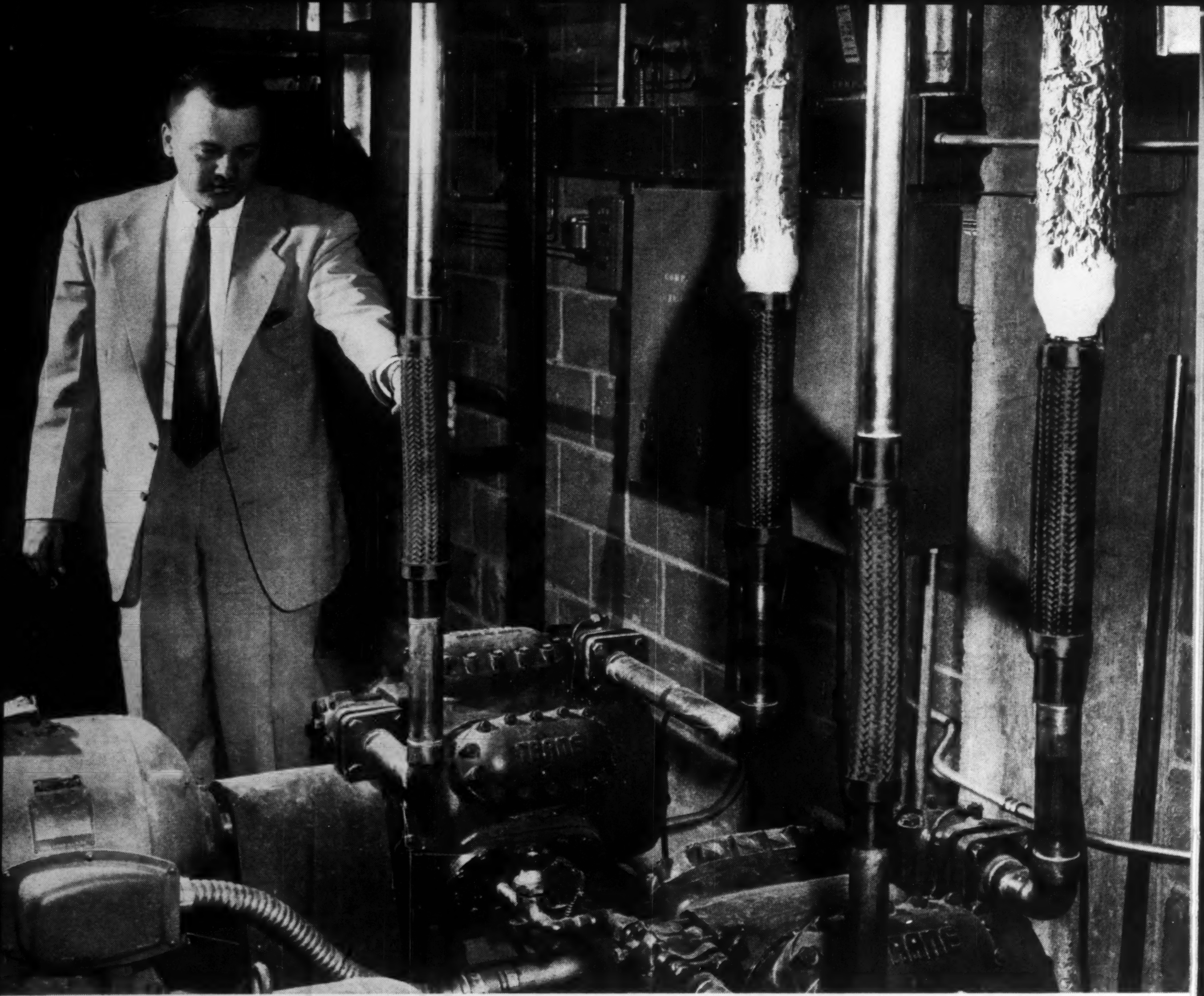
See Our Exhibit
10th EXPOSITION
AIR-CONDITIONING
& REFRIGERATION
INDUSTRY
INTERNATIONAL
AMPHITHEATRE
CHICAGO
NOV. 18-21, 1957

NOV. 18-21

UNITED WIRE
AND SUPPLY CORPORATION

PROVIDENCE 7, RHODE ISLAND

COPPER, BRASS AND ALUMINUM WIRE AND
TUBE . . . BRAZING ALLOYS, PHOSON, SIL-BOND



MR. SHREVE of Shreve Mechanical Contracting checks new installation at National Jewish Hospital, Denver. Four 2⅝" diameter American Vibration Eliminators were installed on air conditioning unit to absorb vibration and noise in piping.

"American Vibration Eliminators lick the vibration problem . . . protect our profit"

reports Mr. T. N. Shreve, Shreve Mechanical Contracting, Denver, Colo.

"American Vibration Eliminators are the best answer we've seen to the vibration problem in piping. First, they mean a satisfied customer. American VE's eliminate damage due to vibration. End customer complaints.

"Second, they lower our costs because we have to make fewer return calls. American Vibration Eliminators provide top service without maintenance. They protect our profit."

YOU CAN USE AMERICAN VE'S WITH CONFIDENCE BECAUSE—

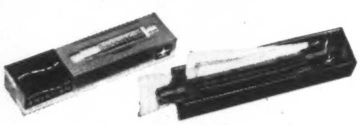
The right metal does the job. The special tin-bronze alloy—the result of American Brass metallurgical know-how—is tailored for the refrigeration and air conditioning industries.

Double signal bronze braid *where extra protection is needed.* On all American VE's 2⅝" O. D. or larger.

Clean, dry, tested, protected. Snip the end of the vaporproof polyethylene bag and you have a factory-fresh unit to install in the line . . . clean, inside and out!

"American" quality materials, construction, packaging mean less maintenance, prevent loss of costly refrigerants, etc. Specify the quality eliminator marked "American" on the ferrule.

57209



Listed by Underwriters' Laboratories through sizes 3⅝" O.D.

For descriptive folder write: The American Brass Co., American Metal Hose Division, Waterbury 20, Conn. In Canada: The Canadian Fairbanks-Morse Co., Ltd.

WHEREVER CONNECTORS MUST MOVE

AMERICAN

FOR AMERICAN VIBRATION ELIMINATORS
SEE YOUR

ANACONDA®
DISTRIBUTOR

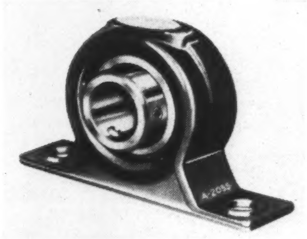
EQUIPMENT DEVELOPMENTS

Continued

Power Drive . . .

. . . for hand pipe tools — *Oster Mfg. Co., Dept. HPAC, E. 289th St. & Nickel Plate RR, Wickliffe, Ohio.*

Model "100" has 2 in. standard pipe range to 12 in. diameters, weighs 77 lb. Features cited by manufacturer: "Power-Matic" front chuck with rocking pivot type insert jaws that grip all kinds of pipe securely in both right, left hand direction; three jaw, universal, self-centering rear chuck for holding longer lengths of pipe; ½ hp universal, reversible, variable speed motor with direct gear drive; seamless steel spindle; speeds 22 to 38 rpm.



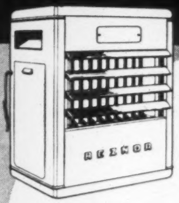
Bearing Units . . .

. . . designed for silent, smooth operation — *Sealmaster Bearing Div., Stephens-Adamson Mfg. Co., Dept. HPAC, Aurora, Ill.*

Bearings available in pillow block, flange, cartridge units which consist of ball bearing units mounted in synthetic oil resistant rubber rings that fit snugly in pressed steel housing, manufacturer says. Features cited: prelubricated at factory; sealed for life; static discharge wire provided.

modern heating for business and industry...

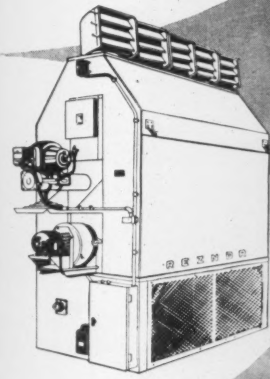
REZNOR UNIT HEATERS



SUSPENDED TYPE

Gas-fired—for use with natural, manufactured, mixed or LP gases. Eleven sizes: 25,000 to 300,000 Btu input. All sizes available with choice of propeller fan or centrifugal blower for air movement. FlexiTemp control system, featuring automatic two-speed fan operation, optional on propeller fan models up to 100,000 Btu. Aluminized steel construction standard, stainless steel optional at extra cost. These heaters are self-contained, completely automatic units for the production and distribution of heat at the point of need. Installation involves only suspension, utility connections and venting. Practically no maintenance required.

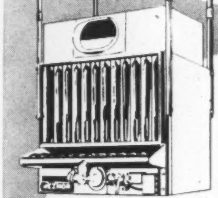
Floor-mounted models for use in offices and similar areas available in 25, 50, 65, and 75 thousand Btu sizes.



FREE-STANDING TYPE

These stainless steel direct-fired heaters are designed for large industrial and commercial space heating jobs. Ten sizes, 400,000 to 2,000,000 Btu input. Heaters can be equipped with gas burners (for natural, mixed, manufactured or LP gases), oil burners (for fuel oils through #5 grade) or dual-fuel burners.

Heaters may be floor-mounted for top discharge or suspended for down-flow or horizontal discharge. They are easily adapted for use in duct systems.



DUCT TYPE

Reznor duct heaters are compact, highly efficient gas-fired heat exchangers with a full complement of operating controls. They are designed for assembly in custom engineered duct systems with components for air moving, cooling and filtering specified to meet exact job requirements.

Series DS sectional duct furnaces (shown) are available in 4 sizes . . . 150, 200, 250, and 300 thousand Btu. Systems with capacities in excess of 2,500,000 Btu can easily be assembled using these four basic units. Aluminized or stainless steel construction. Accessory blowers available to meet most air delivery requirements.

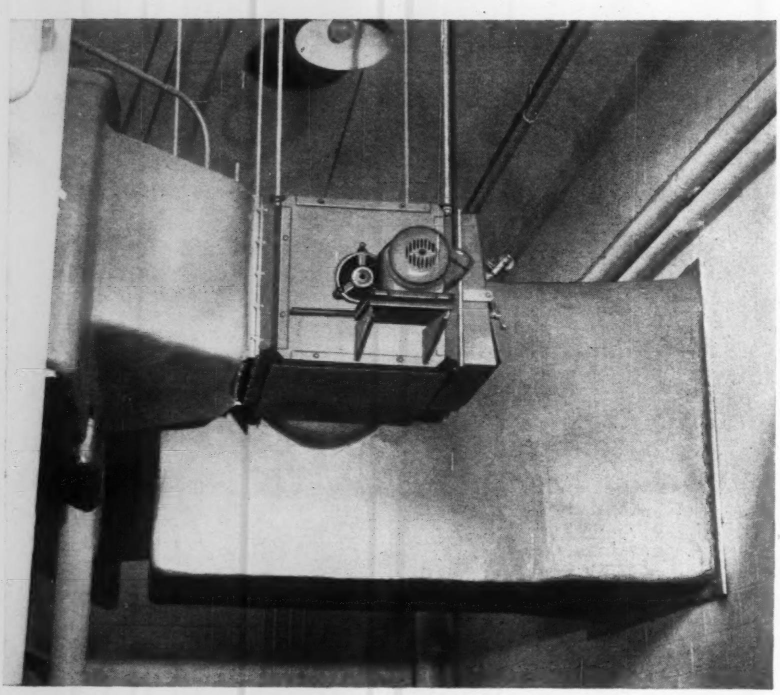
there is no "equivalent" for Reznor unit heaters

for complete details, wherever you are . . .

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST-SELLING DIRECT FIRED
UNIT HEATERS

Reznor Manufacturing Company
51 Union Street, Mercer, Pa.



Do you like to save money?

That's just what you do the minute you install a Wing Draft Inducer.

First, you save money in capital investment, because no tall, unsightly, expensive stack is needed.

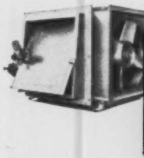
Next, of course, you save money by the elimination of stack maintenance.

Then, you save money on fuel, because you get complete combustion with a Wing Draft Inducer.

And finally, you save money by uninterrupted boiler operation, freed from the uncertainties of natural draft.

If *you'd* like to save money, send for a copy of Wing Draft Inducer Bulletin No. I-57.

L. J. Wing Mfg. Co. 140 Vreeland Mills Road · Linden · N. J.
DIVISION OF AERO SUPPLY MFG. CO. INC.

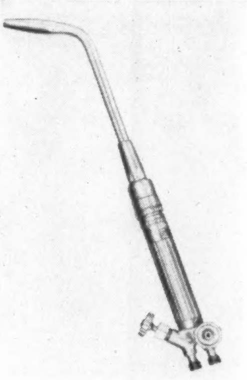


Wing
DRAFT INDUCERS

FANS • UNIT HEATERS • DRAFT INDUCERS • BLOWERS • TURBINES

EQUIPMENT DEVELOPMENTS

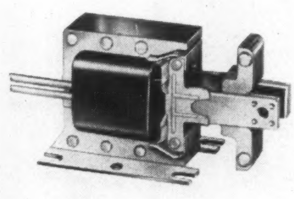
Continued



Welding Blowpipe . . .

. . . for welding metal thicknesses 28 gage to 3 in. — *Linde Co., Div. of Union Carbide Corp., Dept. HPAC, 30 E. 42nd St., New York* 17.

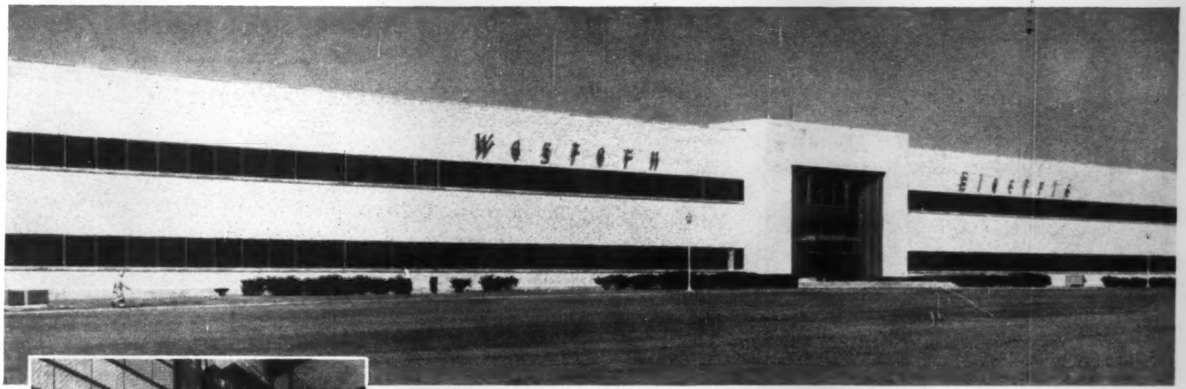
New "W-47" handles heating jobs requiring total gas flows to 1500 cu ft per hr. Simple change of welding heads converts unit from light duty welding and brazing to heavy duty welding or heating, company says. Cutting attachment equips blowpipe for flame cutting on metal to 8 in. thick.



Power Solenoid . . .

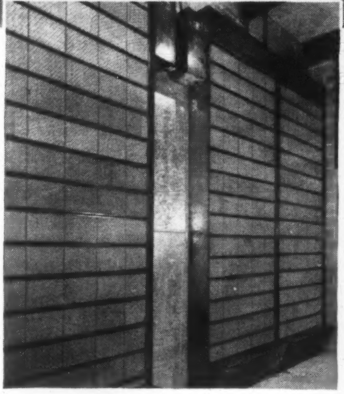
. . . with coil winding in thermo setting epoxy—*Guardian Electric Mfg. Co., Dept. HPAC,* 1621 *W. Walnut St., Chicago* 12.

Designed to prohibit penetration by water, extreme humidity, oils, salt air, acid and alkaline solutions, ether, alcohol, hydraulics. Applications include refrigeration, air conditioning, company says. Features cited: high dielectric strength, resistance to abrasion and thermal or mechanical shock. Available for intermittent or continuous duty operation. Lifts up to 11 lb with ⅛ in. plunger stroke.

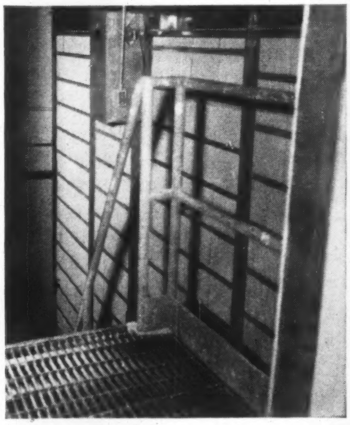


New MERRIMAC VALLEY PLANT of WESTERN ELECTRIC COMPANY, North Andover, Massachusetts.

Architects-Engineers: Western Electric Company
Associate Architects-Engineers: Charles T. Main, Incorporated
Sheet Metal Contractor: C. P. Blouin, Incorporated
General Contractor: Turner Construction Company



Partial view of Continental Self-Cleaning Automatics in one of nine identical fan rooms.



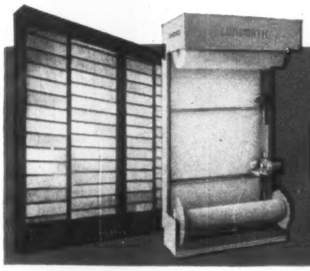
Glimpse into one of 15 similar penthouses showing Continental Self-Cleaning Automatics in use.

CONTINENTAL
clears the air
for this new plant of
WESTERN ELECTRIC

Western Electric's huge new Merrimac Valley Plant combines under one roof many manufacturing operations which had previously been scattered in small units throughout the area. One million square feet of manufacturing space is provided.

For winter heating and summer cooling, Continental clears the air with Self-Cleaning Automatic Air Filters located in *29* different fan rooms throughout this most modern industrial building to handle a total of 2,273,200 cubic feet of air per minute.

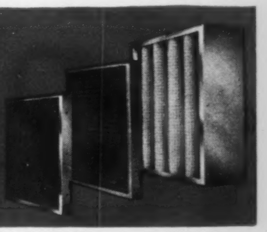
Whatever *your* air cleaning requirements, choose one of the many types of Continental air filters to clear the air for you. You will find the Continental representative in your area a willing source of information . . . or write direct.

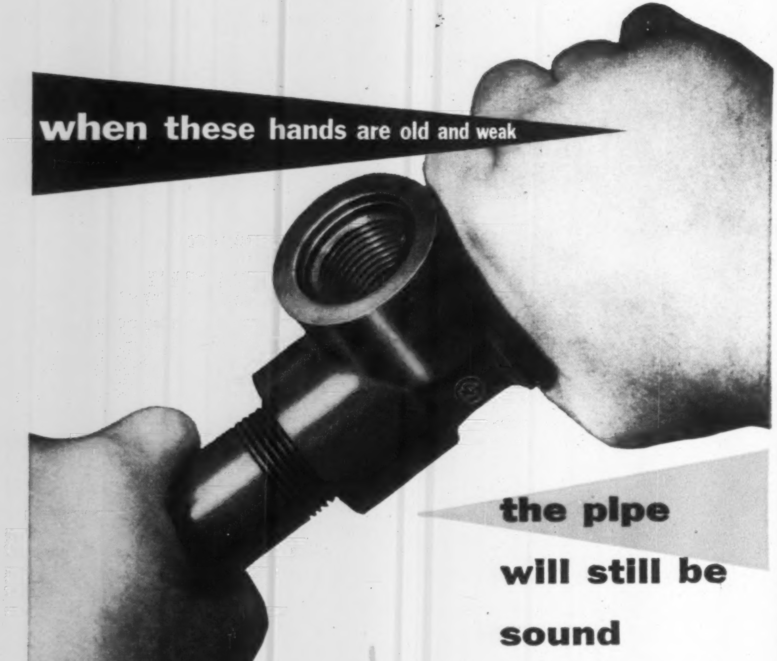


AIR CONTINENTAL FILTERS

P.O. BOX 1647 LOUISVILLE 1, KY.

CONTINENTAL
AIR FILTERS Inc.





New **ACE RIVICLOR®**

Corrosion-resistant plastic piping

RIVICLOR, newest of all rigid plastic pipe, heads the list for resistance to chemicals and excellent aging characteristics . . . plus high strength, toughness and easy workability.

Riviclor is unplasticized polyvinyl chloride, specially formulated for process piping. Non-toxic, non-flammable, excellent insulating properties. Only half weight of aluminum. Never needs painting. Smooth inner surfaces give you high flow rates with low loss of head.

Use Riviclor for all in-plant piping of mild or strong corrosives at normal temperatures . . . for liquid lines where "sweating" or corrosive vapors are problems . . . for underground piping. Pipe, fittings, diaphragm valves from ½" to 2".

Ask for Technical Bulletin CE-56.

Approved For Use With Drinking Water

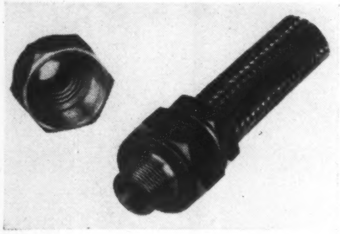
ABBREVIATED TABLE OF CHEMICAL RESISTANCE

Chemical	Rating
ACIDS	
Acetic 50%	S
Chromic 25%	S
Hydrochloric 38%	S
Hydrofluoric 50%	L
Nitric 20%	S
Sulphuric 50%	S
Sulphuric 98%	S
BASES	
Ammonium Hydroxide 28%	S
Sodium Hydroxide 50%	S
HALOGENS	
Sodium Chloride Sat.	S
Ferric Chloride	S
Sodium Hypochlorite 5%	S
MISCELLANEOUS	
Ethyl Alcohol	S
Methyl Ethyl Ketone	U
Gasoline	S
Mineral Oil	S
Animal Oil	S
Vegetable Oil	S
Phenol 10%	S
Chlorine 5%	L
Alum	S
Carbon Tetrachloride	S
Plating Solutions	S
Photographic Solutions	S

KEY: S—Satisfactory
L—Limited to certain applications
U—Unsuitable

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
Ace Road • Butler, New Jersey



Fittings . . .

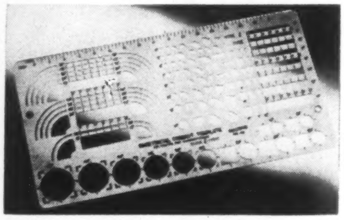
. . . for seamless metal hose — *Seamlex Co., Inc., Dept. HPAC, 41-23 24th St., Long Island City, N. Y.*

Features of units cited: only three parts; solid, one-piece ferrule; metal to metal seat. Specially formed concentric grooves, ridges in internal flat seat of end connector make it unnecessary to smooth, file, grind flat end of flexible tubing, manufacturer says.

Electric Motor . . .

. . . with ratings to 50 hp — *U. S. Electrical Motors, Inc., Dept. HPAC, 200 E. Slauson, Los Angeles* 54.

Unit features advanced dripproof design; two-way ventilation system for uniform cooling; "Ventrifoil" for efficient direction of air, deflection of water, company says. Improved asbestos insulation, dynamically balanced solid cast rotor designed for smooth operation also incorporated.



Duct Template . . .

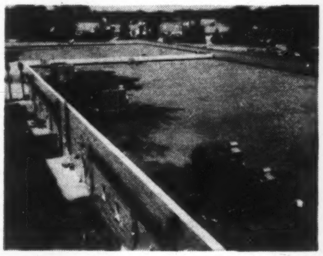
. . . designed to facilitate layout of sheet metal ducts for heating, air conditioning — *Rapidesign, Inc., Dept. HPAC, Box 429, Burbank, Calif.*

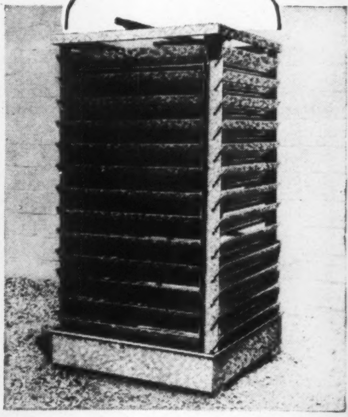
Unit has scale ¼ in. to 1 ft; covers all sizes 4 in. to 48 in. cross sections, either round or square; allows easy depiction of numerous special shapes, reducers, company says. Made of 0.030 plastic.

CHECKMATE RUST
WITH DOVER COOLING TOWERS*

***HOT-DIP GALVANIZED AFTER FABRICATION**

THE fact that all Dover towers are hot-dip galvanized after fabrication was one big reason air conditioning contractors chose Dover towers for the new Mission, Kansas, shopping center. They also liked these other Dover features . . . all offered at no additional cost: 1) stainless steel propeller fan and shaft for long life and trouble-free performance; 2) "take apart" design for easy installation in hard to reach spots; 3) "honeycomb" redwood fill construction prevents channeling of air through tower and loss of efficiency. Dover towers are truly America's New Standard in packaged cooling towers.





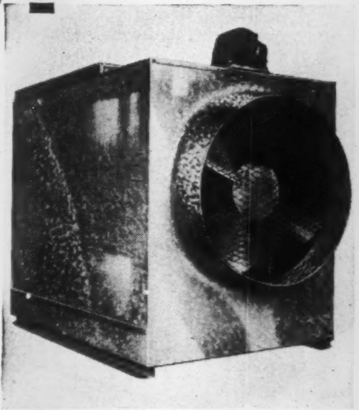
Series K — All-Steel
Series S — Steel and Redwood

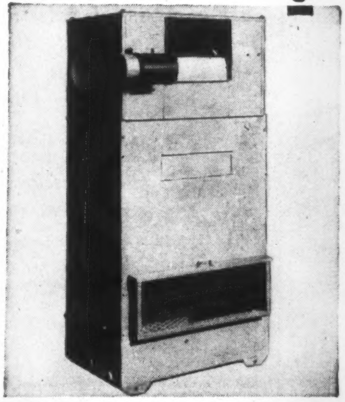
Natural Draft Towers

Available from 2 to 225 tons, they feature bolt-free construction. Series K is perfect for installation where fire codes demand all-steel construction. Series S, somewhat lower-priced, has redwood parts and louvers, and steel basins and crowns.

Series CF **Horizontal Induced Draft Tower**

. . . with propeller fan, from 2 to 100 tons capacity. Well suited for small air conditioning and refrigeration installations, or jacket water cooling. The Series CF is compact, rugged and handsome in design. Built for years of efficient operation.





Vertical Induced Draft Tower Series V

for installation where ductwork is a factor. Has a minimum of piping and is extra quiet in operation. Sizes 5 to 100 tons.

MAKE YOUR NEXT MOVE NOW!

Send today for Dover's catalog illustrating their complete line of packaged cooling towers. Dover checkmates rust and gives dependable, efficient service.

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☐ **Please send me the name of my nearest Dover Representative.**

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What do you mean, "CLEAN AIR"?

Clean air is a matter of degree. Air which by some standards has been "filtered" is much too dirty for many applications. In selecting filters, one fact must be kept in mind —

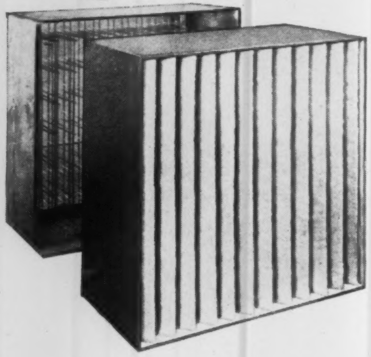
Invisible, Smudge-Producing Particles GO RIGHT THROUGH Most Filters

Only a small percentage of the dust in the atmosphere is visible. Consequently, filters which are reasonably efficient on large dust particles (see ASHAE test below) are much less efficient on atmospheric dust (N.B.S. test) and practically worthless on smoke (DOP test).

STANDARD TESTS — PERCENTAGE OF EFFICIENCY

TYPE FILTER	ASHAE (Weight Test)	NBS TEST # (Atmospheric Dust)	DOP TEST (0.3 Micron Smoke)
Cambridge Absolute	*	*	**99.95 Min.
Cambridge Aerosolve 95	*	90-95	80-85
Cambridge Aerosolve 85	99	80-85	50-60
Cambridge Aerosolve 35	96	30-35	20-30
Electronic Precipitator	99	85-90	60-70
Automatic	76	8-12	2-5
Panel	76	8-12	2-5

*Practically 100%. Test not practical for more accurate reading.
#National Bureau of Standards Discoloration Test.
**Maximum Allowable Penetration of Dioctyl Phthalate Smoke 0.05%. Every filter individually tested.



Cambridge AEROSOLVE® Filters

Available in Range to Meet YOUR High-Efficiency Needs

Cartridges Interchangeable to Meet Changes in Process or Supply-Air Conditions

The annual owning and operating costs of Cambridge Aerosolve Filters are so low that high efficiency air filtration is now practical on all process and comfort conditioning jobs. Cartridges of three available efficiencies fit the same cadmium-plated permanent frames, so that cartridges of higher or lower efficiency can be substituted without change in the filter system.

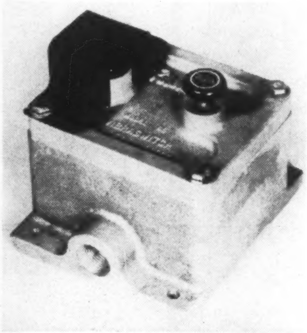
They are easy and inexpensive to install, and there is no maintenance except infrequent, easy cartridge replacement. Service life is much greater even than that of far less efficient filters.

Write for Bulletin 120

Cambridge Filter Corporation
732 E. Erie Blvd., Syracuse 3, N. Y.

Also Makers of the Famous ABSOLUTE® Filter— World's Most Efficient Air Cleaning Device

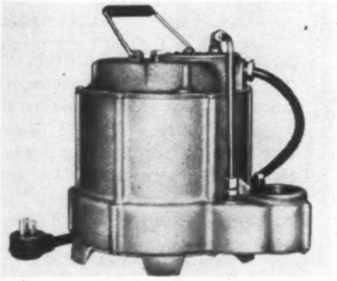
REPRESENTATIVES IN PRINCIPAL CITIES



Vibration Detector . . .

. . . for protecting costly rotation equipment operating with more than normal vibration—*Robertshaw-Fulton Controls Co., Dept. HPAC, 2920 N. Fourth St., Philadelphia 33.*

New model "65-LS" has range of 0-4.5 G's, comes cased in explosion-proof housing. Available with single pole double throw switch, split contact normally open switch, rated at 7 amp, 460 volts a-c.



Submersible Pump . . .

. . . with new design features — *Kenco Pump Div. of American Crucible Products Co., Dept. HPAC, 1305 Oberlin Ave., Lorain, Ohio.*

Capacity of model "110" increased to 5000 gal per hr at 10 ft head with 30 ft shutoff head. Pumping capacity increases scope, utility of unit for heavy duty sump jobs in factories, construction, air conditioning, maintenance, manufacturer says. High torque output of ½ hp motor combined with new direct drive, nonclogging pump impeller. Uses new ceramic seal seat mounted on impeller back to seal motor shaft away from fluid being pumped.

ONE KEY ....to Lower Maintenance Costs

With today's higher labor rates, maintenance is taking a bigger share of plant and building operating costs. Every time a valve needs repair or replacement, the labor alone can easily add up to twice the cost of the valve itself. The only way to cut these costs is to install valves that give the longest service.

- Stemalloy® Stem, the exclusive silicon-bronze alloy that gives longer stem thread life than any other material
- Back seats that permit packing under pressure
- Leak-resistant extra-deep stuffing box
- Close grained bronze for greater corrosion resistance

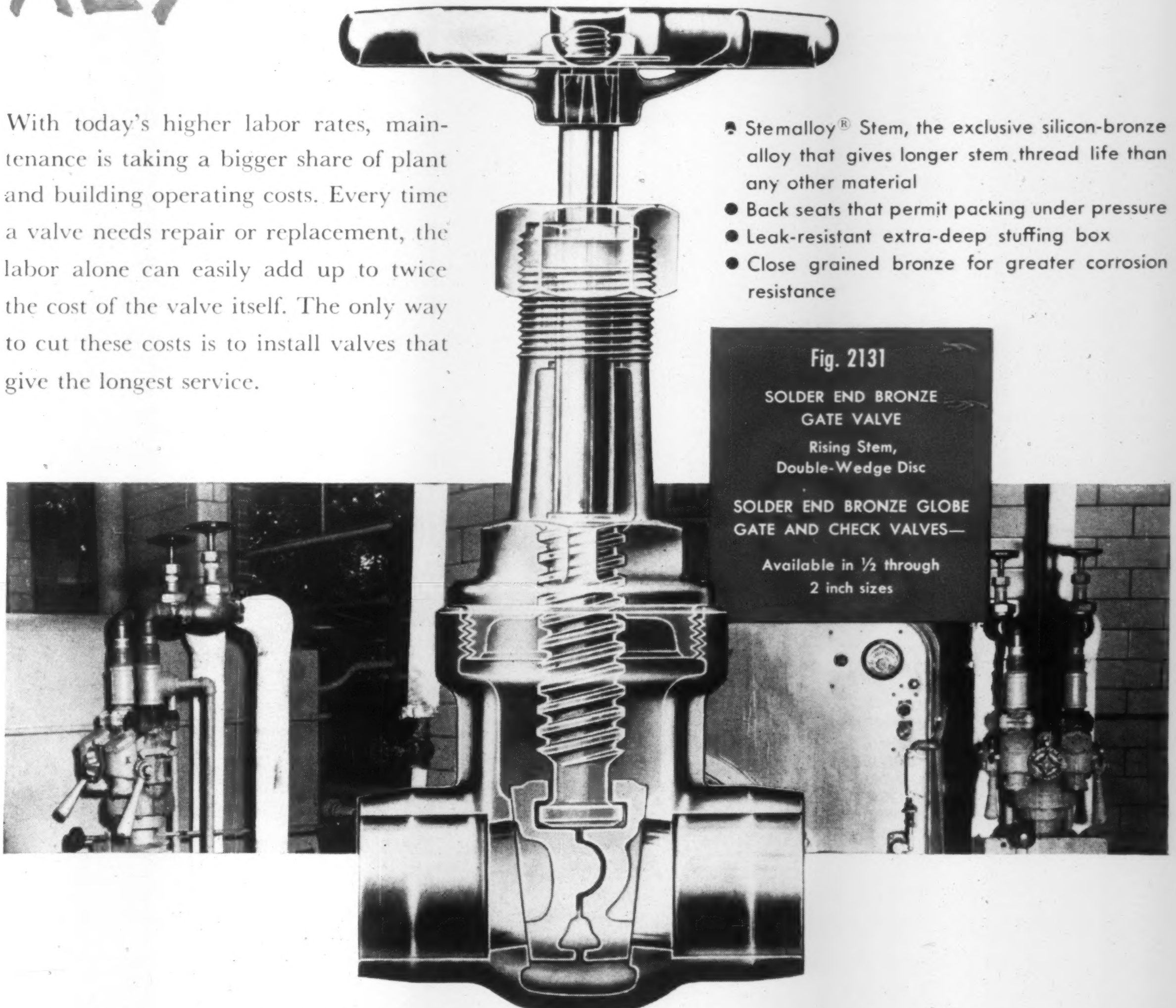


Fig. 2131

SOLDER END BRONZE GATE VALVE

Rising Stem, Double-Wedge Disc

SOLDER END BRONZE GLOBE GATE AND CHECK VALVES—

Available in ½ through 2 inch sizes

Lunkenheimer Solder End Valves provide the top-quality, maintenance-reducing valves needed for steam, hot and cold water lines, heating and air conditioning systems, and oil and gas lines in public and commercial buildings . . . for industrial applications such as water, oil, gas, and steam lines . . . installations where cheap, high-maintenance valves are costing far more than their initial price. For specific recommendations, call your maintenance-minded, service-giving Lunkenheimer Distributor, or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

BRONZE • IRON • STEEL • PVC VALVES

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LUNKENHEIMER QUALITY

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

WAGENER PUMPS

FIT JOB REQUIREMENTS

Wagener pumps meet all requirements for power source, capacity, pressure, viscosity and resistance to abrasive and corrosive actions on each job. They are sturdily built for trouble-free pumping. Self-sealing pumcup packing and divided piston rods reduce maintenance costs to the minimum. They are available in price ranges suitable to anticipated usage. Delivery and service are prompt. Send for details . . . today.

Wagener simplex and duplex pumps in both piston and plunger types can be engineered to job specifications for pumping anything that can be pumped:

ACIDS
ALCOHOLS
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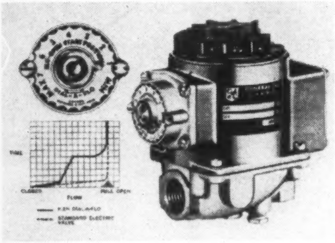
CANTON STOKERS

N-466-CS

EQUIPMENT DEVELOPMENTS

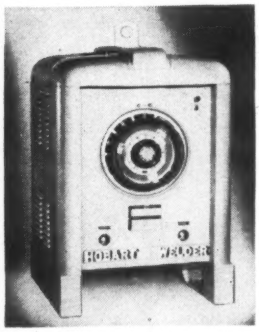
Continued



Gas Valve . . .

. . . with new step opening feature — *General Controls Co., Dept. HPAC,* 801 *Allen Ave., Glendale* 1, *Calif.*

"K-3H" sealed operator hydranoid valve with silicone fluid has "Dial-a-Flo" which enables operator to set dial for particular requirements. Sizes 3/8 to 1 in., capacities to 574,000 Btu per hr. Valve is multi-poised, available on combination valves and in plug-in safety models. Unit opens to adjustable preset start position, continues to open slowly until satisfactory burner operation is established, company says.



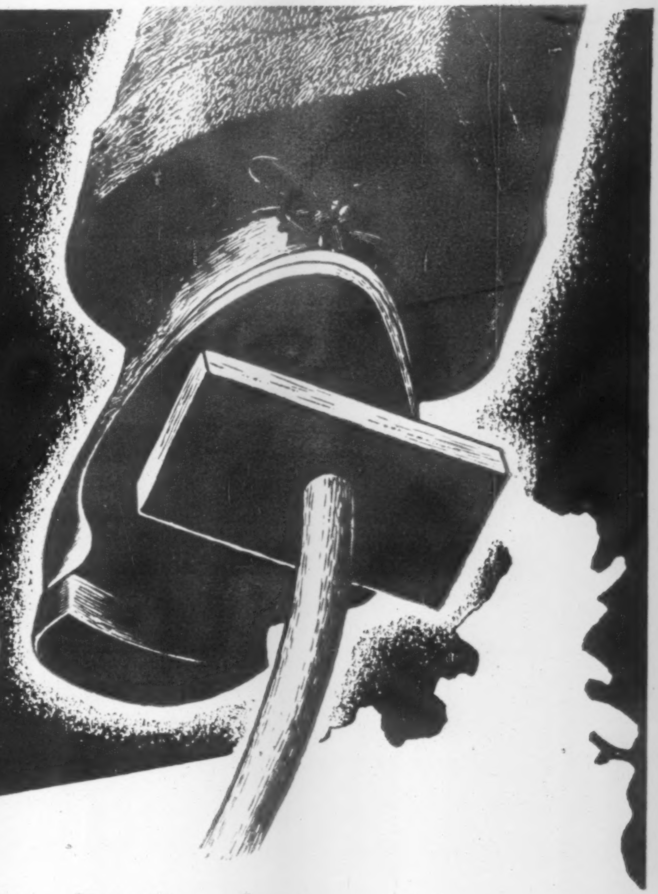
Arc Welder . . .

. . . for operation on single phase, 60 cycle, 230 volt input—*Hobart Bros. Co., Dept. HPAC, Troy, Ohio.*

Output of unit at 30 volts is 295, 250, 200 amp on 20, 30, 50 percent duty cycles respectively. Has transformer with magnetic control designed for maximum efficiency, safety, silent operation, manufacturer says. Available with or without capacitors for power factor correction. Unit is 32 5/8 in. high, 21 in. wide, 21 in. deep, weighs 245 lb. +

Are YOU Putting the Brakes on American Prosperity?

by Buying Foreign Products



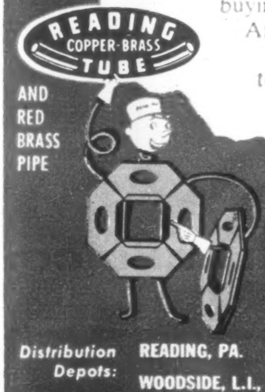
Buy American Quality Products for Full Speed Ahead!

The temptation to buy foreign tubing when it costs less than our quality-controlled American-made products can lead to results more serious than dissatisfying customers and injuring goodwill. It can actually help start an economic slowdown and drastically affect prosperity.

Keep America's quality factories running at full speed by buying American-made quality products. Only then can American wage earners receive full pay envelopes. Only then can they buy enough American goods to keep prosperity at its peak.

Note to Contractors:

Continue to BUY AMERICAN quality tubing and pipe—and your dollars will build new American projects . . . new markets for YOU!



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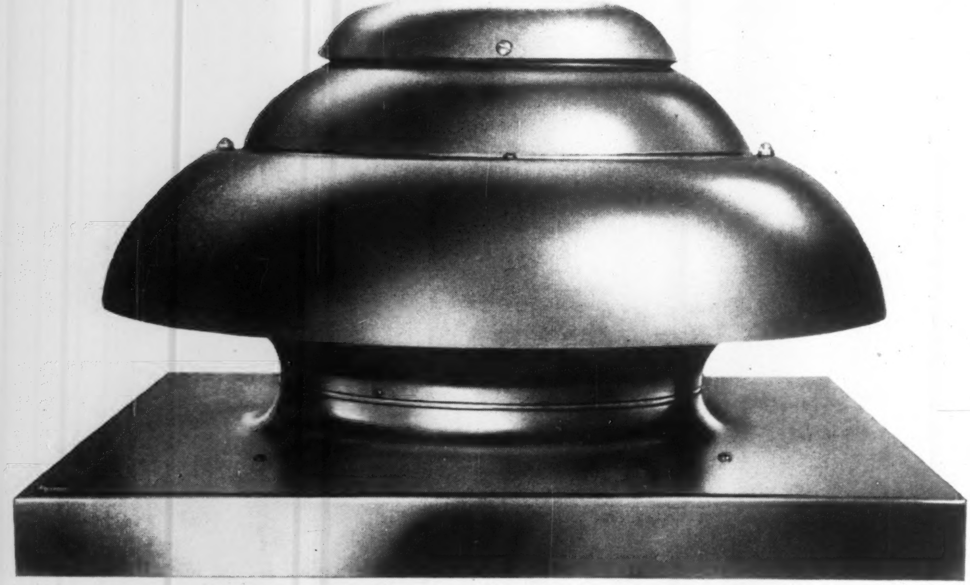
690 Murphy Ave.
S.W., Unit 5, Bldg. B



ILG Type CRF ROOF VENTILATORS provide powerful air exhaust for single or multi-story buildings. "Unitized" fan, motor and housing make installation easy. Ilg motor has permanently lubricated ball bearings—is direct-connected to backward-curved airfoil blade type centrifugal fan. Long life, minimum service, quiet operation are assured. Capacities to 25,000 CFM are certified by PFMA label.

ILG®

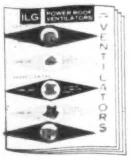
The Man from Ilg can help you choose the right size. Whatever your ventilating problem, plan to talk it over with The Man from Ilg.

ILG ELECTRIC VENTILATING CO.

2826 N. Pulaski Road, Chicago 41, Illinois   Offices in 56 Principal Cities

Send for New Bulletin on Power Roof Ventilators

Describes the advantages, features and specifications of Type CRF and other Ilg power roof ventilators. Request your free copy of Bulletin No. 1905.



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For refrigerants that are Super-Dry

Always be sure to specify...

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SUPER-DRY REFRIGERANTS

Tops in quality . . . Tops in performance

Available from wholesalers everywhere.

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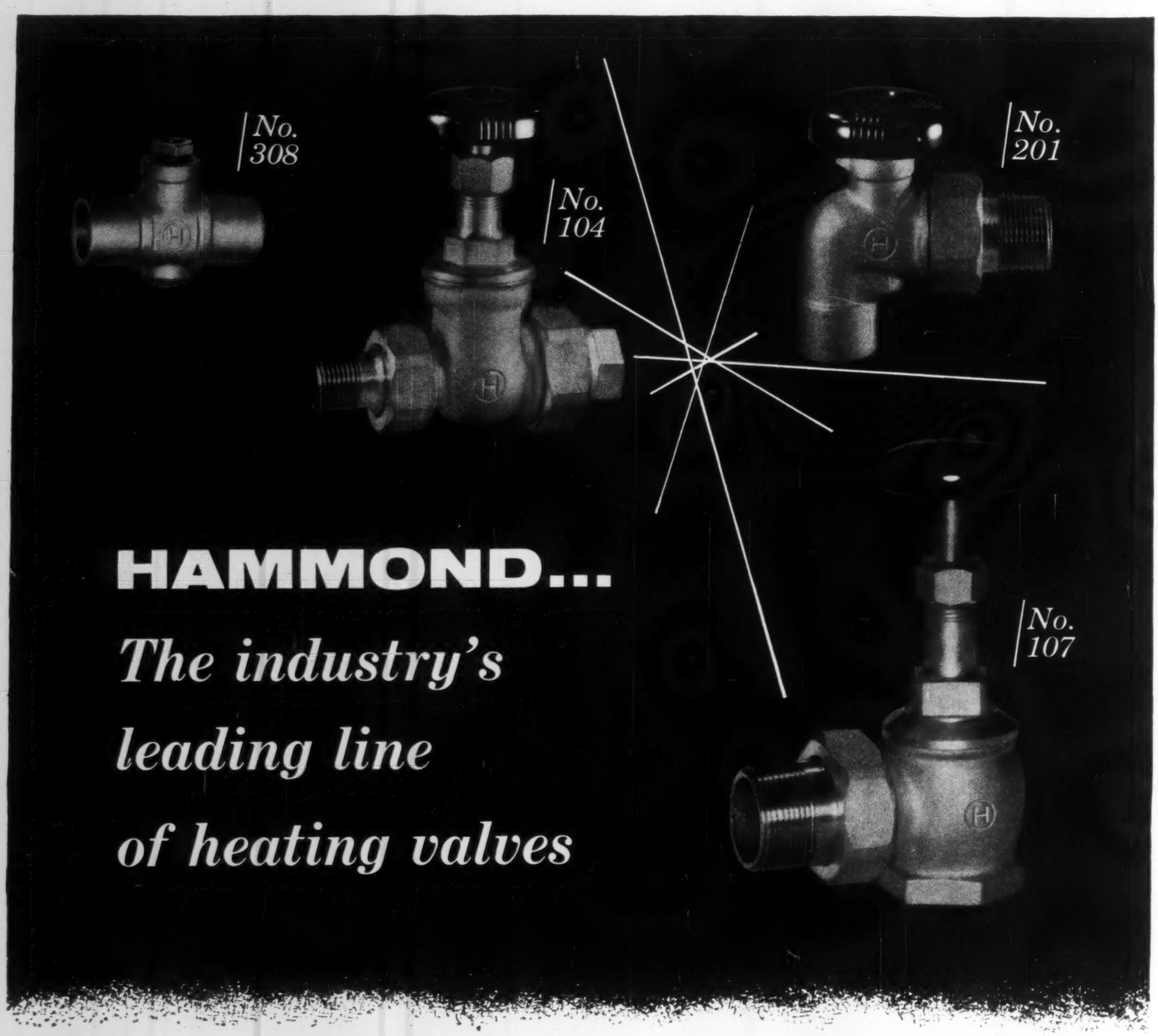


HAMMOND, leader in bronze valves, offers one of the largest and most comprehensive lines of heating valves. Included are packed type radiator valves and elbows for steam and gravity hot water systems, and circulating valves, balancing elbows and fittings for forced hot water heating systems. All are available for copper to copper as well as with screwed ends.

And each of **HAMMOND**'s 24 different types of heating valves has been specifically designed for outstanding performance in a particular job. For example, No. 107 heavy duty steam angle valve is designed for 150 lbs. WSP. It has a gland follower and double packing . . . plus a backseat which allows it to be repacked under pressure.

No. 104 convector gate valve was especially designed for use with convector radiators—has double unions, male and female. No. 201 circulator was developed for use with circulating-type hot water systems—includes male union, and sweat connection. No. 308, for balancing radiant floor, wall and ceiling panels, is a balancing straightaway fitting with sweat connections, no unions.

Write today for a copy of our condensed catalog No. 146 which describes **HAMMOND**'s complete line of heating valves. **HAMMOND** heating valves are stocked by a leading plumbing wholesaler in your city. See him today.

HAMMOND BRASS WORKS, HAMMOND, INDIANA

HAMMOND *BRITE-KOTE*® **BRONZE VALVES**

RECENT TRADE LITERATURE . . .

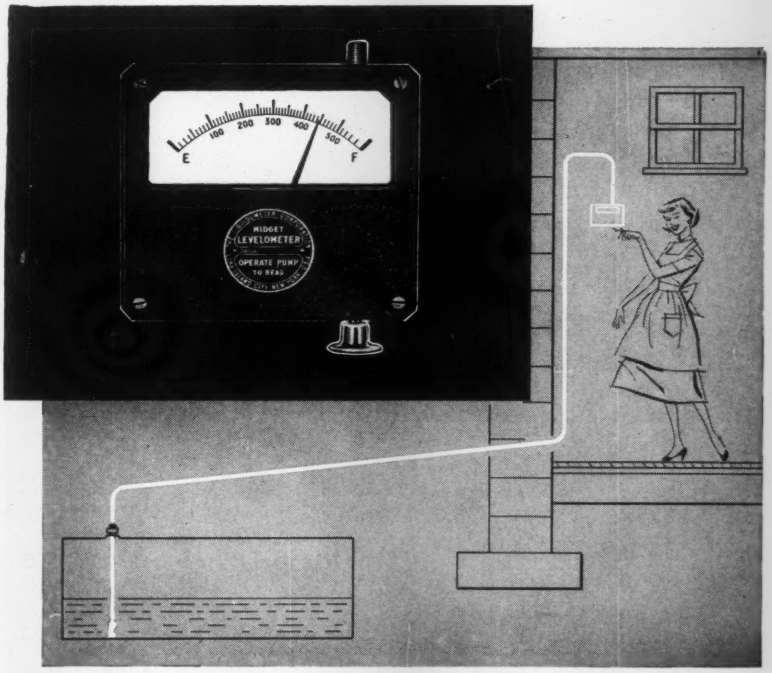
▶ *ACID SCALE, RUST REMOVER*—New bulletin describes powdered acid scale and rust remover. Features of product cited by company: shipping, storing convenience; lack of acid fumes; safety on various metals; easy to use. Solution concentrations, application methods included. *Oakite Products, Inc., Dept. HPAC,* 157 *Rector St., New York* 6.

▶ *AIR CONDITIONERS*—New leaflet CR-5715L contains engineering details of "Spotaire LRC" individual room air conditioners. Product photograph, dimensional cross-section, construction, performance data listed for four models. *Drayer-Hanson, Div. of National-U.S. Radiator Corp., Dept. HPAC,* 3301 *Medford St., Los Angeles* 63.

▶ *AIR CONDITIONER*—Year 'round air conditioner designed for "through the wall" installation in large buildings described in new 8 page brochure. Unit is self contained, air cooled with integral heating elements suitable for use on hot water, steam, vapor heating systems, company says. Available for cooling, heating, or both with 3/4 or 1 hp motor. *Warren Webster & Co., Dept. HPAC,* 17*th and Federal Sts., Camden* 5, *N. J.*

▶ *AIR DUCT*—New bulletin S11 supplies information on type "57-1A" air duct for conducting hot and cold air in high, low velocity air conditioning systems. Three different air conditioning problems solved through use of duct described. Illustrations provided. *Wiremold Co., Dept. HPAC, Hartford* 10, *Conn.*

▶ *AIR OUTLETS*—New 4 page data sheet 50 entitled *Streaking & Smudging Around Air Outlets* lists sugges-



LOW-PRICED...QUALITY MIDGET LEVELOMETERS

GIVE DEPENDABLE INDICATION OF TANK CONTENTS

Midget Levelometers provide home owners and plant engineers with reliable, easy-to-read, trouble-free indication of fuel supply. The dangers and inconvenience of old-fashioned dip sticking and taping methods are eliminated. In the plant, fire and labor hazards are cut . . . costly shut-downs caused by lack of fuel are avoided.

Levelometers operate on an adaptation of the hydrostatic principle. They establish a balance between the height of the liquid to be measured and an indicator. Dial type indication provides maximum readability. Levelometers are precision built, rugged, easy to install and constructed of the finest materials. Approved by UL, FM and BSA, New York, they are used for gaging fuel oil, diesel oil, gasoline and a variety of other liquids.

Levelometers are available in several sizes for a wide variety of applications. For complete information write Dept. A

LIQUIDOMETER INSTRUMENTS

THE LIQUIDOMETER CORP.
SKILLMAN AVENUE AT 36TH STREET, LONG ISLAND CITY 1, N.Y.

Contractor: Mannen & Roth, Cleveland, Ohio

When you're up in the air about fastening . . . use *Ramset*®!

Fastening ducts to the framework of a new building can be done hours, even days, faster with RAMSET. RAMSET did this job 80% faster, and saved this contractor $24.00 per day, per man!

RAMSET reaches hard-to-get-at places faster, easier. It's powder-actuated. No bulky power lines or heavy equipment to drag around. Power and fasteners are conveniently carried in the operator's pocket. Ideal for ladder and scaffold work, RAMSET's one-hand operation results in less fatigue.

If you need fasteners in a hurry, your RAMSET dealer will deliver them to you "on-the-job". He's listed under "Tools" in the phone book. Also ask about SHURE-SET® hammer-in fastening tool for light-duty fastening (it's a RAMSET companion tool).

Write now for new catalogs.

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION
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RECENT TRADE LITERATURE

Continued

tions for keeping wall and ceiling outlets clean, neat appearing. Methods presented to combat dust and dirt carried by primary, secondary, induced air streams. *Air Filter Institute, Dept. HPAC, 300 Independence Ave., S. E., Washington 3, D. C.*

▶ *AIR, VACUUM PUMPS*—New 16 page catalog describes air and vacuum pumps, gas boosters, air motors. Details of construction, dimensions, capacities, performance curves, installation given. Two, four wing types; fan cooled, water cooled, radiator air cooled models; motor driven units; direct coupled, belt driven models; integral pump, motor; tank units discussed. *Leiman Bros., Inc., Dept. HPAC,* 102 *Christie St., Newark* 5, *N. J.*

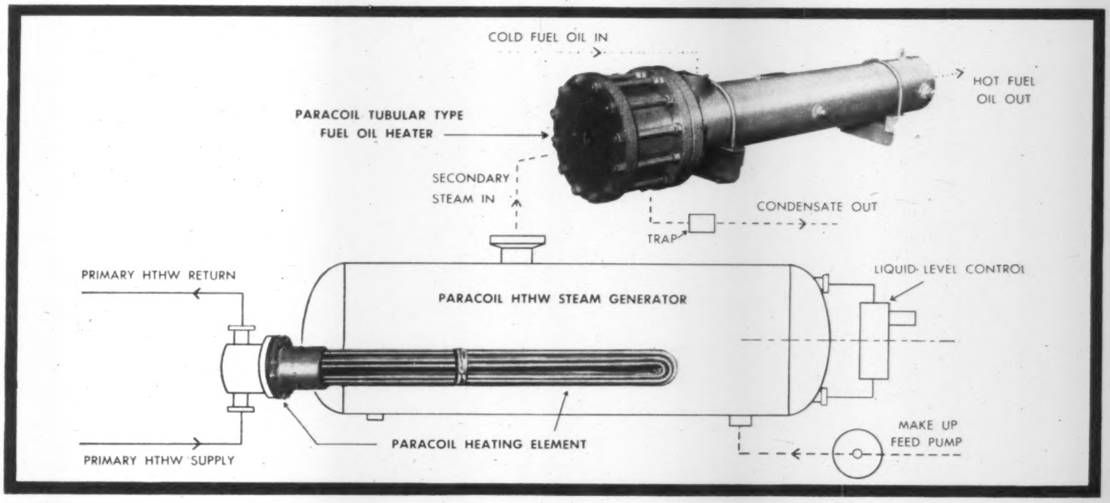
▶ *ASBESTOS PAPERS*—New brochure has chart showing thickness; weight; tensile, tear, bursting strength of commercial, fibroid asbestos papers. Eight different types for use in varied types of industry explained. *Johns-Manville, Dept. HPAC,* 22 *E. 40th St., New York* 16.

▶ *BEARINGS, ROD ENDS*—Spherical bearings, rod ends highlighted in new bulletin 257. Features of units, engineering data, illustrations included. *Sealmaster Bearing Div. of Stephens-Adamson Mfg. Co., Dept. HPAC, Aurora, Ill.*

▶ *BENDING MACHINES*—New 24 page catalog 356 has 90 illustrations of bending machines showing 65 different applications in bending tubing, pipe, extrusions, rolled sections. Fifty illustrations showing tooling arrangements included. Specifications given for standard models with maximum size tubing, angle, channel that may be bent on each machine. *Pines Engineering Co., Inc., Dept. HPAC, Aurora, Ill.*

CUT ALONG DOTTED LINE AND SAVE

Idea no. 1 from Paracoil


COLD FUEL OIL IN
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HOT FUEL OIL OUT
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CONDENSATE OUT
TRAP
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PARACOIL HTHW STEAM GENERATOR
LIQUID-LEVEL CONTROL
MAKE UP FEED PUMP
PARACOIL HEATING ELEMENT
PRIMARY HTHW SUPPLY

How to use secondary steam to pre-heat no. 6 oil in a High Temperature Hot Water system

Paracoil engineers know that the first consideration in the design of an oil preheating system for an HTHW installation must be absolute freedom from the possibility of oil leak contamination of the main HTHW stream. A completely isolated oil preheater circuit is recommended. This can be accomplished by means of a secondary heat transfer circuit that does the actual heating. In this way, only the secondary circuit is exposed to possible contamination — the main HTHW circuit is protected at all times.

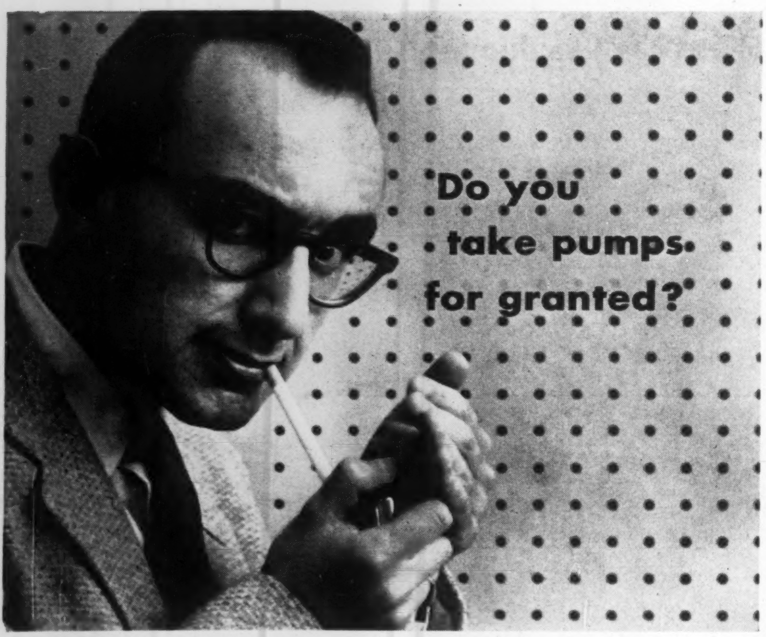
One of the ways that this isolation is achieved is illustrated above. Additional isolation circuits will be commented upon in future "Idea Sheets". Watch for them!

How to design a protective circuit

1. **Install a steam generator.** Use a Paracoil Heating Element with the HTHW main energy stream as its heat source. With water at 350° F, steam at 25 psig (267° F) can be easily generated in an economically sized unit.
2. **Use the steam thus generated** . . . to heat the fuel oil in a Paracoil Tubular Oil-Type Fuel Oil Heater.* This type heater provides the highest rate of heat transfer — more than **three times** that of the conventional straight tube type.
3. **The condensate from the oil heater** . . . may be returned to the steam generator or sent to waste depending upon plant policy. If the re-use of the condensate is important, absolute surety of its quality can be obtained through the use of the Paracoil Oil Leak Condensate Inspection System.*

Paracoil engineers have designed and built many oil preheater protective systems for both stationary and marine installations. They now offer their experience and know-how to all who are involved in HTHW activities. ***Write for complete data.**

DAVIS ENGINEERING CORPORATION
30 Rockefeller Plaza, New York 20, New York • Circle 6-5650


"Do you take pumps for granted?"

Pumps are old stuff to us. But now and then we're still amazed at all the work they do. And we know it's important that they *keep* working.

Take, for example, the 39 Goulds pumps ordered for the new plant being built by the Buckeye Cellulose Corporation. A number-happy chap figures they'll do the work of a bucket brigade of about 3800 men—and cost considerably less.

Those 39 pumps, by the way—they range from a little one-inch model up to five in the 14″ size—can move well over 8,000,000 gallons of liquid an hour. Because much of Buckeye's pumpage is corrosive, many of the pumps are of stainless steel.

The gist of all this: Pumps are important in almost any plant—they deserve a lot of careful planning—the kind of planning we've been doing for 109 years.

The kind of planning we can put to work for you whether you pump acids, paper stocks, corrosive alkalies, salt water, slurries, or just plain old water.

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West Coast Representative: GOULDS PUMPS Western, Inc., 1919 N.W. Thurman St., Portland 9, Oregon
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RECENT TRADE LITERATURE

Continued

▶ *BOILERS*—New 12 page booklet contains diagrams, descriptive literature, capacities, dimensions for commercial boilers. Company's three-pass "TP" series, low water line "LWL" series, split sectional type "C" discussed. Units are 3650 to 42,500 sq ft steam, 5840 to 68,000 sq ft water. Btu's range 876,000 to 10,200,000 output. *Portmar Boiler Co., Inc., Dept. HPAC,* 193 *Seventh St., Brooklyn* 15.

▶ *BOILER SAFETY CONTROLS*—New 24 page catalog covers basic safety controls for all low pressure steam boilers. Methods of providing maximum safety, automatic water level control highlighted with diagrams, charts. Cases of typical small domestic boilers, multiple boiler installations with mechanical return systems described. *McDonnell & Miller, Inc., Dept. HPAC,* 3500 *N. Spaulding Ave., Chicago* 18.

▶ *PLANT VENTILATORS*—New 8 page bulletin lists company products including industrial plant ventilators. Brief history of company given with details of present engineering staff, production control, testing, services. Fifteen illustrations of representative installations included. *American Steel Band Co., Dept. HPAC, Box* 565, *Pittsburgh* 30.

▶ *CONDENSING UNITS*—New 4 page booklet contains information on "Blu-Cold" hermetic condensing units. Twenty models discussed: 1/5 to 2 hp; air, water cooled; high, medium, low temperature. *Lehigh Mfg. Co., Dept. HPAC, Lancaster, Pa.*

▶ *CONTROL CABINETS*—Supplement sheet G200B describes control cabinets used with "Fan Air" gas burners having capacity range 4 million to 32 million Btu per hr. Cabinets, 12 × 16 × 6 in., have

Air Conditioned Throughout with

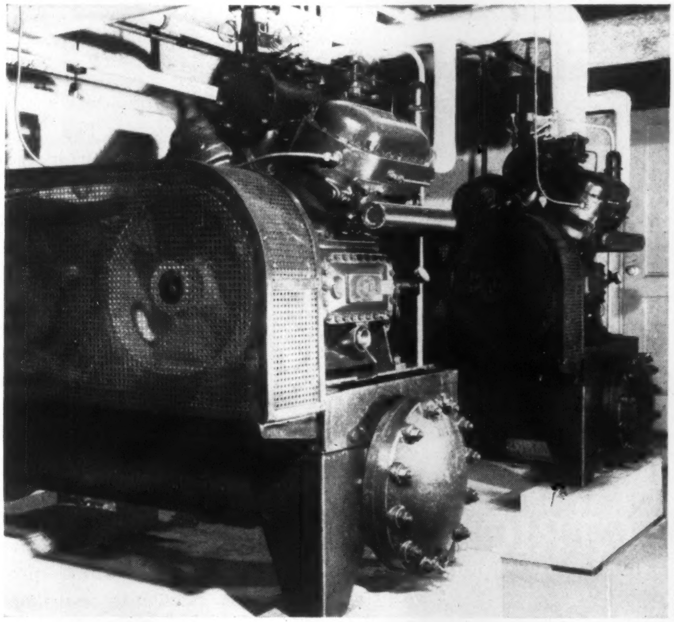
TRADE **FRICK** MARK

Refrigeration

4200 Marine Drive Apartments, Chicago, Ill. Architect: Lewis Simon. Mech. Eng.: Arthur Wallace. Installing Contractors: Midwest Eng. & Equipment Co., Economy Plumbing & Heating Co.

These sixty-four new apartments at 4200 Marine Drive, in Chicago, enjoy complete air conditioning, among other advantages.

Two "ECLIPSE" refrigerating units, installed by Midwest Engineering and Equipment Co., Frick Sales-Representatives in Chicago, carry the cooling load with economy and dependability.



What are YOUR cooling needs? If you want cool air, cold drinking water, ice, freezer temperatures, or refrigeration for processing—in any commercial or industrial size—let us quote now on your requirements. Branches and Distributors in principal cities, the world over.

Frick "ECLIPSE" refrigerating units at 4200 Marine Drive Apartments, Chicago

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA., U. S. A.

SINCE 1913
MARATHON ME ELECTRIC

HEATING
AIR CONDITIONING
MOTORS

BLOWER MOTORS
OIL BURNER MOTOR

A COMPLETE LINE OF EXPLOSION PROOF MOTORS AVAILABLE ALL CARRY THE LABEL

FOR
UNIT HEATERS .... OIL BURNERS
BLOWERS .... COMPRESSORS
VENTILATORS .... PUMPS
COOLING TOWERS..................... etc.

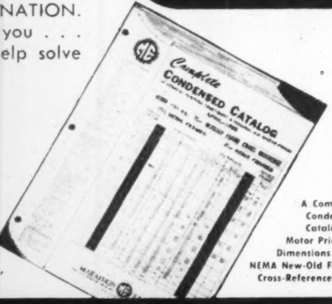
- EXPERIENCE . . . PROVEN PERFORMANCE. There is no substitute for the reliability of proven performance . . . Top Names of the Nation's Industry have proven ME performance in PRODUCING QUALITY PRODUCTS.
- VERSATILITY . . . WIDE RANGE OF DESIGN. Single Phase . . . Polyphase . . . Direct Current NEMA Standard . . . or Special Design ME can design to meet your special specifications.
- SERVICE . . . THROUGHOUT the NATION. There is an ME District Office near you . . . Call our Sales Engineer TODAY to help solve your motor problem.

MOTORS
1/20 HP thru
2500 HP

GENERATORS
1/2 KW thru
2000 KW

Yours for the Asking

WRITE DEPT. 21,
WAUSAU, WIS.



A Complete Condensed Catalog of Motor Prices & Dimensions with NEMA New-Old Frame Cross-Reference List

SINCE 1913
MARATHON ME ELECTRIC
HOME OFFICE AND FACTORY, WAUSAU, WIS. FACTORIES AT ERIE, PA. AND EARLVILLE, ILL.
SALES OFFICES IN PRINCIPAL CITIES

RECENT TRADE LITERATURE

Continued

hinged door equipped with flush lock, key. Fixed panel above door allows lamps, switches to be mounted, company says. *Mettler Co., Inc., Div. of Eclipse Fuel Engineering Co., Dept. HPAC, 4366 Worth St., Los Angeles 63.*

▶ *PIPE, TUBE CUTTERS*—New circular describes two types of "Roll-A-Round" machining units for cutting pipe, tube, angles, channels, etc. One type is power operated; other is moved around guide track manually. Four standard sizes illustrated: 6 in. pipe, 12 in. pipe, 18 in. OD shapes, 25 in. OD shapes. *Wallace Supplies Mfg. Co., Dept. HPAC, 1300 Diversey Pkwy., Chicago 14.*

▶ *DIAPHRAGM VALVE*—New 6 page brochure 800 describes "D-D" diaphragm valve for pressure, vacuum service. Among features cited by company: disc for positive closure, diaphragm for positive sealing, abrasive action of fluid flow, pressure primarily absorbed by disc, corrosion resistant union end. Specifications, dimensions, illustrations provided. *W. S. Rockwell Co., Dept. HPAC, 200 Eliot St., Fairfield, Conn.*

▶ *DUST COLLECTORS*—New booklet entitled *How Much Are You Paying for Dust?* features illustrations, application stories demonstrating typical installations of cabinet cloth filter and cyclone separator dust collectors. Economies resulting from use of units explained by manufacturer. *Torit Mfg. Co., Dept. HPAC, Walnut & Exchange Sts., St. Paul, Minn.*

▶ *ELECTRODE GUIDE*—New 70 page pocket guide ADC-650G contains electrode consumption calculator—in tabular form—which provides data for calculating consump-

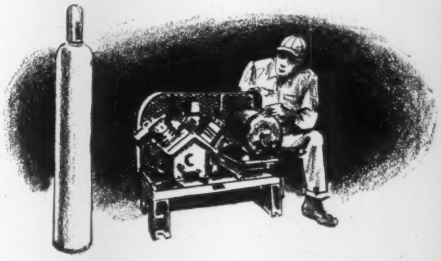
HIGHLIGHTS

FROM "THE STORY OF FREON®"

(ARI Show, Chicago)

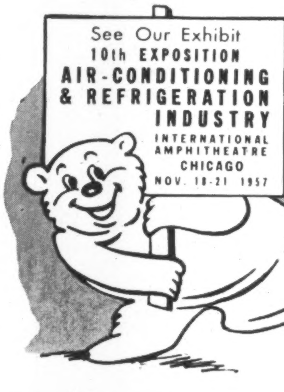
CAVEMEN *GROPED DOWN TO THE DARK COOL RECESSES OF THEIR CAVES TO ESCAPE THE HOT SUMMER HEAT.*

ANCIENT EGYPTIANS *PLACED POROUS EARTHEN JARS OF WATER ON ROOF TOPS OVERNIGHT. RAPID EVAPORATION FORMED THIN ICE, WHICH WAS COLLECTED TO COOL THE PHARAOH'S DRINKS.*



TODAY *REFRIGERATION AND AIR CONDITIONING CONTRIBUTE VITALLY TO ALMOST EVERY AREA OF OUR SOCIETY. WITHOUT FREON* REFRIGERANTS, MUCH OF THE PROGRESS MADE IN THESE FIELDS WOULD NOT HAVE BEEN POSSIBLE.*

DON'T MISS THE COMPLETE STORY OF "FREON" AT THE ARI SHOW


See Our Exhibit
10th EXPOSITION
AIR-CONDITIONING
& REFRIGERATION
INDUSTRY
INTERNATIONAL
AMPHITHEATRE
CHICAGO
NOV. 18-21 1957

• You'll see unusual displays, live demonstrations, a fascinating exhibition of the properties of "Freon", and many other interesting and instructive features. Be sure to see our exhibit in booth 402 at the 10th Exposition Air Conditioning and Refrigeration Industry in Chicago, November 18 to 21.

**Freon and combinations of Freon- and F- with numerals are Du Pont's registered trademarks for its fluorinated hydrocarbon refrigerants.*

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Recommend
FEDERAL FILTERS
for Bigger Profits..
Happier Customers

FEDERAL
FILTER
MODEL A77
PAT. PENDING
MFG. BY NORWOOD PRODUCTS CO.
DIVISION OF
A. R. WOOD MFG. CO. LUVERNE, MINN

Provides uninterrupted trouble-free service!

The Federal's filter pockets trap contaminating impurities found in fuel oil and prevent clogging of burner nozzles. This means trouble-free furnace operation and the end of expensive service call-backs. One model handles all filtering jobs, whether pressure or gravity type. Can be mounted in practically any position . . . in a jiffy! Suggest the Federal Filter for faster sales—bigger profits.

Bonus Profits from CARTRIDGES!

This unique 16-pocket filter element is in great demand and will bring countless repeat orders for extra profit! Easy to install.

NORWOOD PRODUCTS CO. • LUVERNE, MINN.
A division of A. R. WOOD MFG. CO., Luverne, Minn.

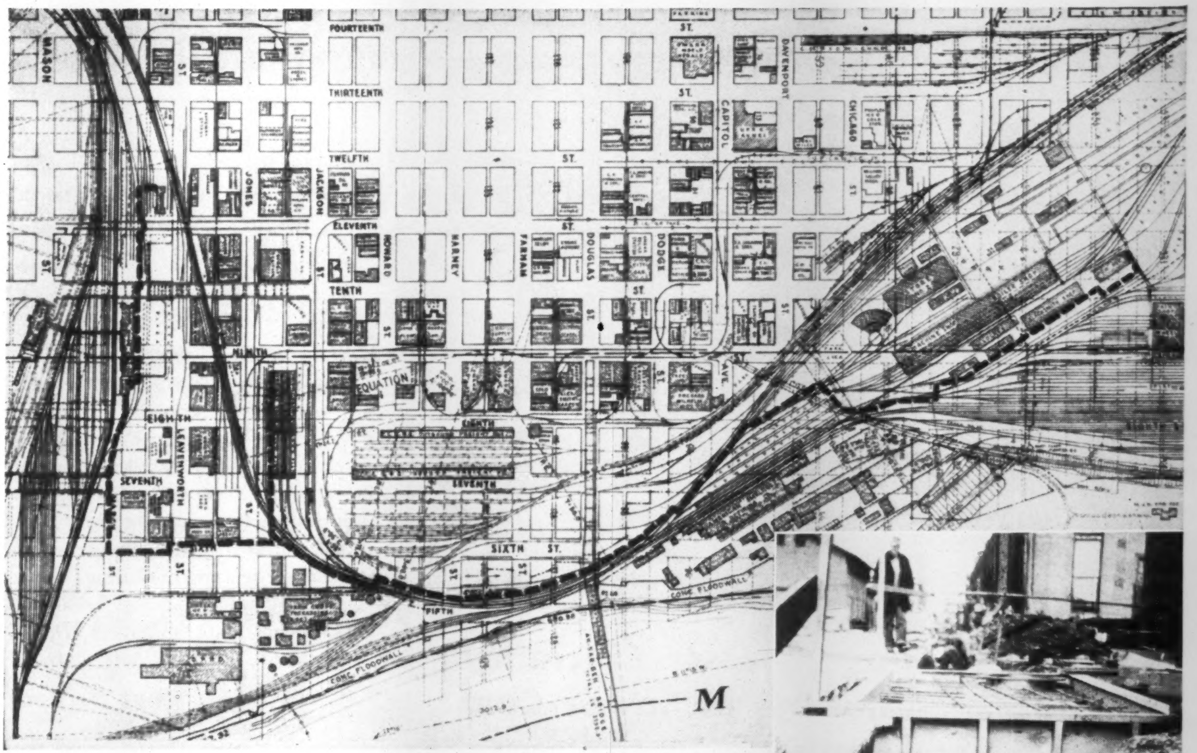
tion per linear ft in welding of joints. Applications, procedures for welding of electrodes described. Weld metal chemical analyses, mechanical properties included. *Air Reduction Sales Co., Inc., Dept. HPAC,* 150 *E.* 42*nd St., New York* 17.

▶ *ELECTRODE HOLDER*—Four page booklet describes insulated 300, 400 amp "Cooltong." Among features noted: durable glass fiber reinforced handle, "unbreakable" jaw insulation, high conductivity body, fully insulated stainless steel spring. Company says holder stays cool, is lightweight, has proper balance. *Lincoln Electric Co.; Dept. HPAC,* 22801 *St. Clair Ave., Cleveland* 17.

▶ *EXPANSION VALVES*—Six new bulletins on thermostatic expansion valves offer technical information on "A-P" valves with emphasis on mechanical data. Valves ¼ to 19 ton capacities for wide range of refrigerants discussed. Application information, specifications, selection tables, dimensions included. *Controls Co. of America, Dept. HPAC,* 2450 *N.* 32*nd St., Milwaukee.*

▶ *FANS*—New "LS" type direct drive fans described, illustrated in 4 page brochure 775. Units, with "Macheta" airfoil propellers, available in ring, square panel, duct types; sizes 24 to 48 in. Chart of certified ratings included. *Aerovent Fan Co., Inc., Dept. HPAC, Piqua, Ohio.*

▶ *FASTENING DEVICES*—New 38 page catalog 12B describes plastic screw anchor kit which includes anchors, screws, masonry drill; plastic screw anchor tube kit; lead anchor kit with anchors, screws, setting tool. "Lok-It" wire connector wrench for two sizes of screw type wire connectors; six new sizes of nylon cable



Union Pacific installation (heavy dotted line) runs under pavement to various shops and buildings. Gilsulate has high load-bearing capacity, takes heavy pounding here.

9250 ft. of GILSULATE®-covered steam lines help Union Pacific run smoothly in Omaha

Under tracks, alongside of tracks, under heavily-trafficked streets—practically all types of tough in-service conditions have been overcome by GILSULATE at Union Pacific Railroad's Omaha installation. Running from the main boiler room of the UP shops to the Union Station, the distribution system consists of three sections: 1) a 2800-foot section of 8-inch steam line; 2) 5300 feet of 8-inch steam and a 4-inch diesel oil line; 3) 1150 feet of 3-inch steam line branching from section (2) and carrying 150 psi steam plus 100 degrees superheat.

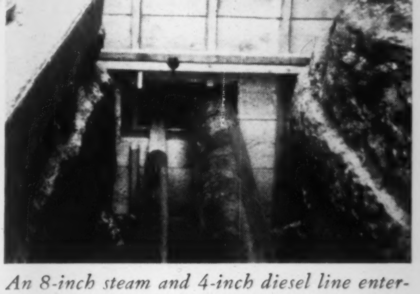
First installed in 1954 and continually subjected to pounding, shock and vibration from heavily-loaded freight trains and normal yard traffic, this GILSULATE system has functioned flawlessly. 810 tons of Type C GILSULATE were used initially, and additional installations are being made here and at other Union Pacific yards.

GILSULATE's insulating efficiency, all-around pipe protection, and high loading capacity make it the ideal choice for this and other types of installations. More and more, architects, engineers and contractors are discovering that GILSULATE provides permanent corrosion protection for hot underground pipes at the lowest cost per installed linear foot of any other pipe insulation system.

Investigate the value of low-cost, easily-installed, dependable GILSULATE. See your local GILSULATE distributor for a convincing demonstration. Complete details are yours for the asking. Write the office nearest you.

AMERICAN GILSONITE COMPANY
SALT LAKE CITY 1, UTAH

Affiliate of Barber Oil Corp. & Standard Oil Co. of Cal. OFFICES AT 134-B West Broadway, Salt Lake City, Utah, The Agents Building, 3537 Lee Road, Cleveland 20, O.



An 8-inch steam and 4-inch diesel line entering a bellows-type expansion joint in a manhole; system was installed by UP crews.

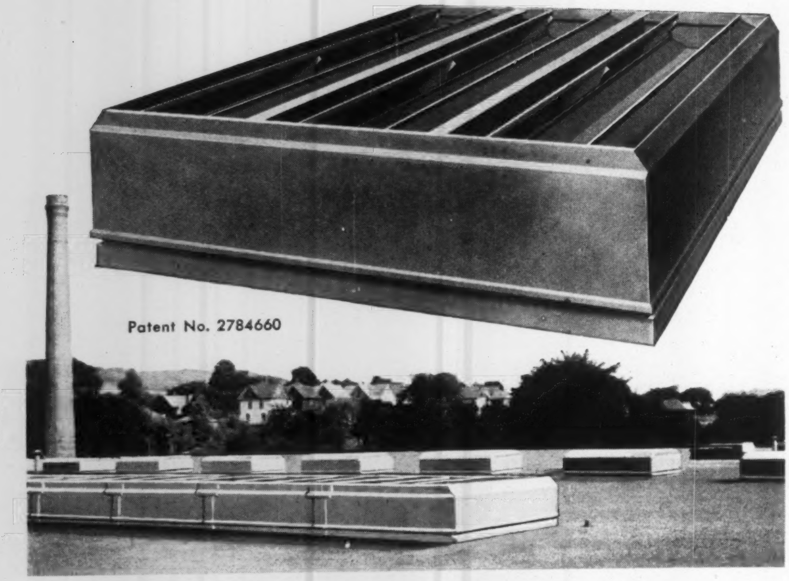
FACTS ABOUT GILSULATE

1. **EASY TO USE**—just pour and tamp . . . pipe heat does the rest.
2. **FORMS 3 ZONES** of protection against heat loss and all hazards commonly encountered by hot buried pipes.
3. **NEEDS NO HOUSING OR MECHANICAL SHEATHS:** no mixing, special handling or equipment.
4. **ONLY NEEDS NORMAL PIPE SPACING:** for multiple pipe or cramped conditions.
5. **THREE TYPES AVAILABLE:**
   Type A for 220°-300°F. temp. range
   Type B for 300°-385°F. temp. range
   Type C for 385°-520°F. temp. range

GILSULATE®

The Triple-Zone Insulation System For Lifetime Protection of Underground Hot Pipes

Do you receive PIPE INSULATION NEWS? Ask to be put on our mailing list.



Lower Contour, Higher Efficiency in roof ventilators, at Lower Cost with Swartwout's new

Contouramic

Airmover®

Nearly a foot lower than any roof ventilator previously offered, Contouramic Airmover follows the trend to neater roof appearance. But there's no sacrifice of efficiency! In fact, capacity is *increased* — and many other advantages follow:

With less bulk, there's less weight — less wind resistance — lower maintenance — lower first cost.

And automatic opening of dampers in case of fire is added as a standard feature.

Contouramic Airmover can be used in various ways: for "spot" ventilation over heat-producing operations; for safety ventilation above stages; and in runs or complete roof coverage to achieve large scale ventilation. And it's absolutely weatherproof.

Use this newest concept in roof ventilation on new buildings or for added relief on older ones.

Write today for Form 312-F.

THE SWARTWOUT COMPANY
18511 EUCLID AVENUE • CLEVELAND 12, OHIO

Swartwout **ROOF VENTILATORS AND VENTILATING LOUVERS**

ALSO AUTRONIC PROCESS CONTROL EQUIPMENT

RECENT TRADE LITERATURE

Continued

clamps; "Tape Mate" fish tape winder in two sizes also discussed. Altogether, 400 items are illustrated. *Holub Industries, Inc., Dept. HPAC, Sycamore, Ill.*

▶ *FLEXIBLE CUSHION COUPLING*—New 12 page bulletin describes how "Para-flex" coupling with rubber tire element accommodates angular and parallel misalignment while cushioning shock loads, diminishing torsional vibration. Illustrations, drawings show construction, installation features including "Taper Lock" method of mounting on shafts. Engineering data provided. *Dodge Mfg. Corp., Dept. HPAC, Mishawaka, Ind.*

▶ *HEAT GENERATORS*—Industrial uses of infrared heat energy generators pointed out in new 22 page catalog SH-20. Heating, construction, chemical, metal fabricating among industries discussed. More than 50 illustrations included. *Perfection Industries, Div. of Hupp Corp., Dept. HPAC,* 1135 *Ivanhoe Rd., Cleveland, Ohio.*

▶ *HEAT TREATMENT*—Pamphlet ASL-289-M offers information on heat treatment of Croloy 2¼, grades T22, P22. It details yield strength, tensile strength, elongation, reduction of area, hardness at various annealing temperatures. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *STOKER FIRED HEATING*—New guide contains specifications for typical low pressure commercial heating plant consisting of 2-500 lb per hr screw type underfeed stokers. Adaptable for design loads 3000 to 24,000 EDR (steam), 750,000 to 5,500,000 Btu per hr. Contains ideas

NEW IMPROVED

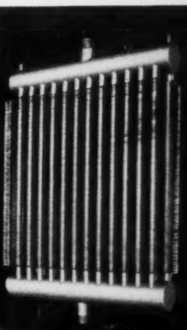
Airtherm

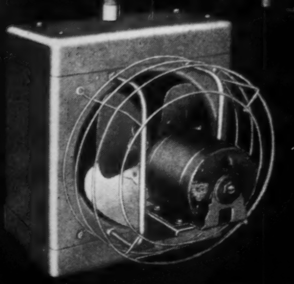
PROPELLER FAN

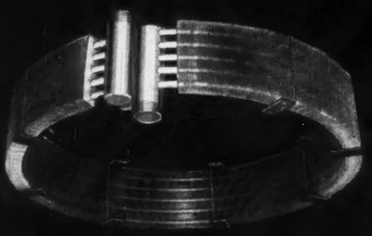
UNIT HEATERS

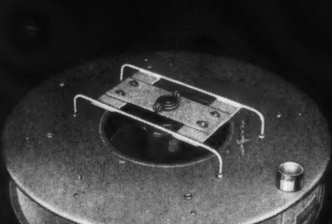
FOR STEAM OR HOT WATER

A SIZE FOR EVERY REQUIREMENT





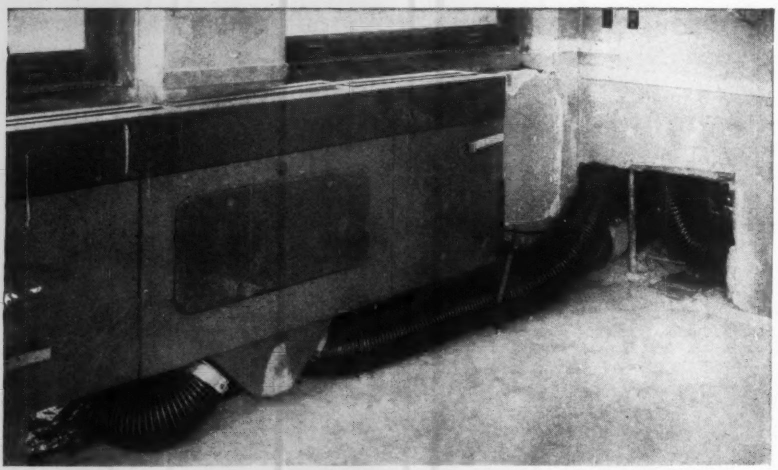




The new Airtherm line incorporates 22 completely redesigned vertical units and 24 improved horizontal units, ranging from 18,000 to 555,000 BTU per hour, with a choice of outlet diffusers to cover practically every air distribution pattern and mounting height. Silent operation is assured by resiliently mounted motors, properly designed fans and casings, and attention to face and outlet velocities. All fans are expertly positioned, balanced and tested. Each unit is tested and rated for performance in strict accordance with the Standard Test Code of the industry. Only brand name, continuous duty motors, especially made for the purpose, are used and mountings are designed for efficient cooling and easy servicing. Rugged coils are formed by hydraulically expanding copper tubing into plate type aluminum fins, each with its own collar, providing increased heat transfer and wide, even spacing to reduce clogging. All coils are tested and tagged for 500 p.s.i. hydrostatic pressure. Casings are phosphatized to insure a long, rust-free life for the attractive baked enamel hammer tone finish.

For Complete Specifications Including a Guide for Selection and Application, Write:

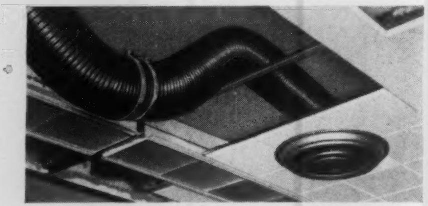
AIRTHERM MANUFACTURING CO.
702 S. SPRING AVE. • ST. LOUIS 10, MO.



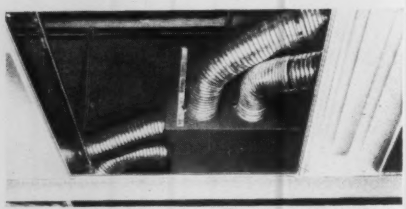
The Travelers Insurance Co., Hartford—Wiremold connected to underwindow unit in modernized building.

MAKES CONNECTIONS ANYWHERE

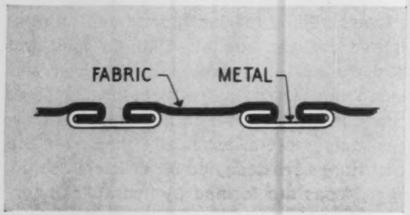
Wiremold flexible Air Duct simplifies installation of underwindow units



Indiana Nat'l Bank Bldg., Indianapolis—Wiremold Air Duct runout from branch duct to ceiling diffuser.



Socony Mobil Bldg., N. Y. C.—Wiremold Air Duct "octopus" in a high-velocity air conditioning system.



Exclusive construction—fabric component and supporting steel spiral are mechanically interlocked.

Installing underwindow air conditioning units can be a tough job. None are tougher than in the modernization of older buildings. But Wiremold's flexibility makes these connections easily. Wiremold is the versatile duct for air conditioning . . . high or low velocity . . . in old or new buildings.

Made by an exclusive process that mechanically interlocks the fabric with the supporting steel spiral, there is no glue to dry out and cause duct failure. As a result, Wiremold Air Duct provides long life and good performance. Its light weight makes it easy to handle — especially important in cramped quarters.

- **good air flow with minimum pressure loss**
- **no air leakage at normal operating pressure**
- **meets National Board of Fire Underwriters requirements**
- **compensates for misalignments between connections**
- **allows for future relocation of units**
- **acts as a vibration damper**
- **easy to cut, fit and install**

SEND FOR FOLDER NO. 591 for further information on Wiremold Air Duct.

WIREMOLD® FLEXIBLE AIR DUCT

THE WIREMOLD COMPANY, HARTFORD 10, CONNECTICUT

RECENT TRADE LITERATURE

Continued

brought forth by consulting, fuel engineers who specialize in coal utilization, company says. Drawings of typical boiler room, overfire air system, boiler controls, stack included. *Bituminous Coal Institute, Dept. HPAC, Southern Bldg., 15th & H Sts., N.W., Washington 5, D. C.*

▶ *AIR HEATING SYSTEMS*—New 8 page catalog illustrates typical installations of underfloor heating systems using clay pipe or allied clay products. Items covered are clay pipe, clay pipe with factory made joints, commonly used and special purpose clay pipe fittings, clay flue lining, wall coping, clay pipe heating ducts. *Robinson Clay Product Co., Dept. HPAC, 65 W. State St., Akron 9, Ohio.*

▶ *HOT WATER SYSTEM*—Information on packaged hot water supply system available in 4 page bulletin 300-657. System consists of heavy duty volume water heater, "Strata Temp" storage tank, hot water circulating pump, controls, valves, thermometer, etc. Recommended by company for apartments, offices, hospitals, clubs, hotels, other buildings. *Laars Engineers, Dept. HPAC, 13246 Saticoy St., North Hollywood, Calif.*

▶ *LUBRICATED PLUG VALVES*—New 19 × 24 in. chart contains maintenance, lubrication information for lubricated plug valves. Detailed exploded views of four types of valves—two bolt cover, screwed gland, three bolt, "Hypreseal" — included. Table of recommended lubricants for oil, water, gas chemical service featured on chart. *Rockwell Mfg. Co., Meter and Valve Div., Dept. HPAC, 400 N. Lexington Ave., Pittsburgh 8.*

▶ *MECHANICAL TUBING*—Eight page bulletin describes features of

AGITAIR®

Custom Made

SQUARE and RECTANGULAR

AIR DIFFUSERS

Custom made in unlimited air patterns, AGITAIR square and rectangular air diffusers suit all job conditions . . . blend perfectly with any interior design.

These AGITAIR diffusers need not be centrally located. They assure draftless, noiseless, equalized air distribution from any location in the ceiling or side wall.

Write for Catalog R107 for complete data on these Agitair Diffusers

THERMOTANK — AGITAIR®

high velocity units • punkah louvers
air diffusers • filters • exhausters

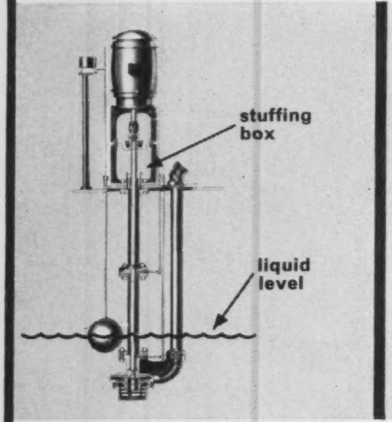
Sold exclusively by representatives for:

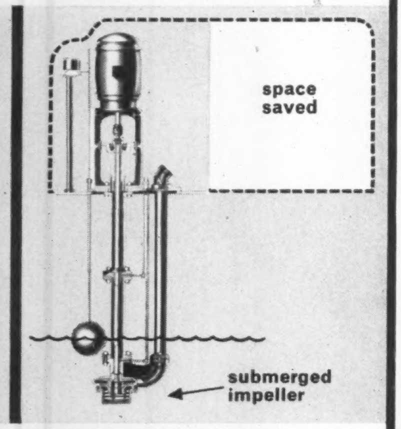
AIR DEVICES INC.

185 MADISON AVENUE, NEW YORK 16, N. Y.

you stop leakage, save space, and cut costs with Yeomans

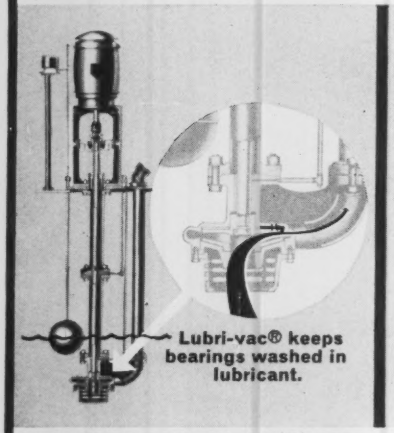
VERTICAL WET PIT PUMPS

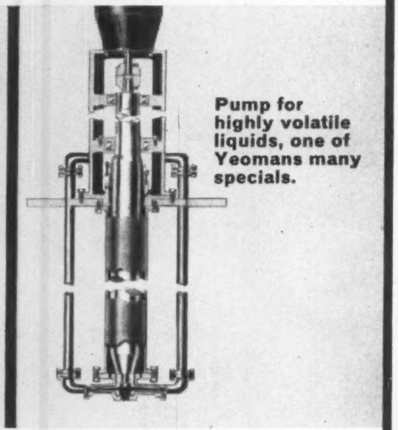




ELIMINATE LEAKAGE. Stuffing boxes and seals are not under liquid pressure. With the Yeomans Vertical Wet Pit Pump there are no costly, annoying, or dangerous liquid leaks, as with horizontal pumps.

SAVE FLOOR SPACE. They use less than half the space required by horizontal pumps. Also, no priming equipment is needed as with suction lift horizontals. Impellers are submerged in the liquid ready for service.




Pump for highly volatile liquids, one of Yeomans many specials.

CUT MAINTENANCE COSTS. With exclusive Lubri-vac® bearings are kept free of abrasive matter. Lubricant pressure prevents fluids from working into bearings. Result: Bearing failures are 90% less than with conventional vertical wet pit pumps.

SPECIAL DESIGNS. 59 Years of experience has enabled Yeomans to develop many excellent special designs for pumping "problem materials." All pumps can be furnished with ferrous and nonferrous alloy parts as required.

Capacity range from 5 to 10,000 g.p.m.

YEOMANS

Manufacturers of: pumps for drainage • sewage • condensation return • water supply and circulation • equipment for treatment of domestic and industrial wastes.

Yeomans, 2000-5N. Ruby Street, Melrose Park, Illinois

Please send me the catalog on Yeomans Heavy-Duty Vertical Wet Pit Pumps for...

☐ solids-free liquids

☐ solids-bearing liquids

name__________

company__________

street__________

city__________ zone_____ state________

RECENT TRADE LITERATURE

Continued

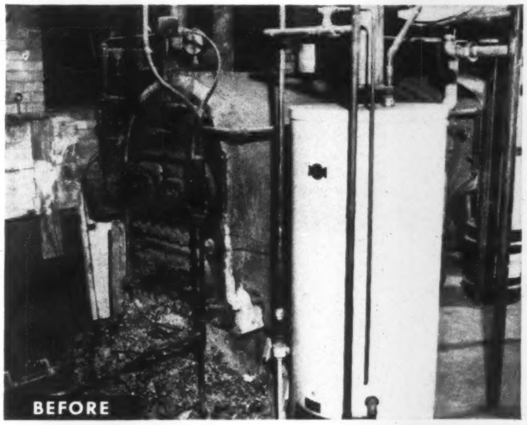
"Electric Resistance Welded" mechanical tubing. Information on mechanical properties, various size tolerances listed. Eleven charts included. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *METERS*—Eight page booklet 54-76-38 contains illustrations, engineering data, charts of "Veriflow" meters for measuring, indicating, totalizing. Features cited by company: accurate measurement; product, cost control; visibility; uninterrupted service. "Veritrol" meters designed for controlling also discussed. *Hays Corp., Dept. HPAC, Michigan City, Ind.*

▶ *METERS*—Bulletin N-157 contains 12 pages of metering information including several case histories. Various meters, registers; maintenance rules; installation suggestions; results of surveys in food, chemical processing industries described. More than 30 illustrations provided. *Neptune Meter Co., Dept. HPAC, 19 W. 50th St., New York 20.*

▶ *NAME PLATES*—New brochure 57190 provides details of name plates for identifying valves, switches, controls. Included are stock metal, bakelite plates; identification tags; brass valve tags; stamped plastic valve tags. More than 250 standard wordings available in stock, company says. *Seton Name Plate Co., Dept. HPAC, 431 W. Rock Ave., New Haven 15, Conn.*

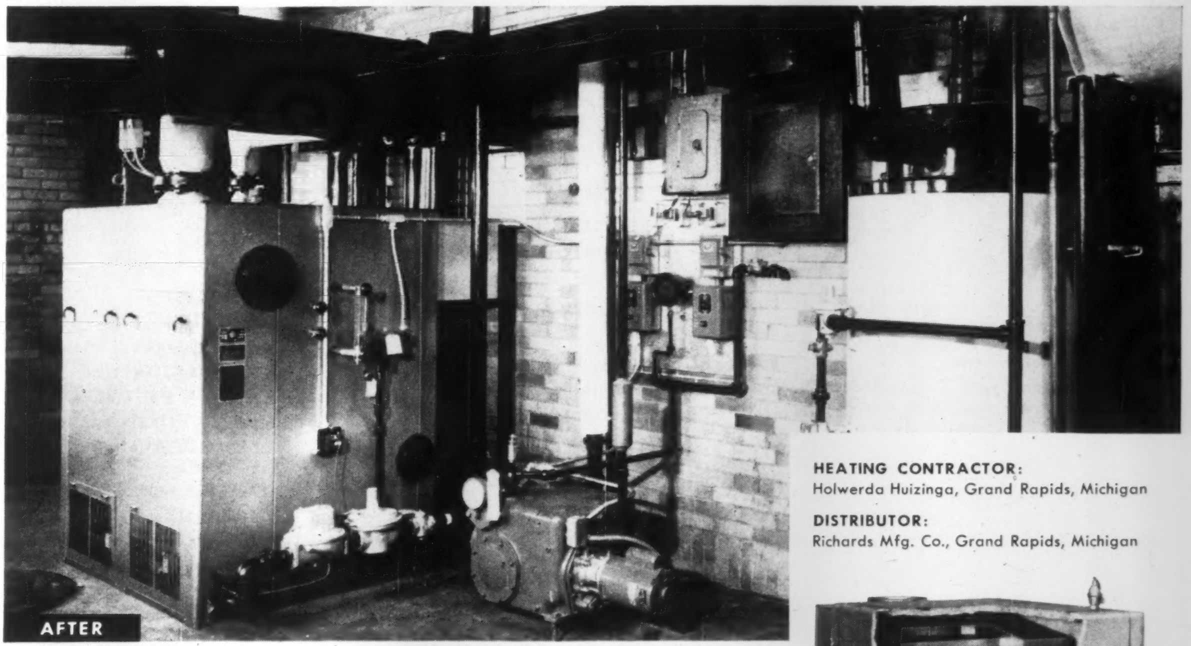
▶ *NYLON TUBING*—New folder prepared for air conditioning engineers and designers has samples of nylon tubing with suggestions for applications. Among features of product cited by company: high burst strength, high temperature resistance, clarity in thin sections.



BEFORE

WHY WAS A WEIL-McLAIN TYPE J GAS FIRED BOILER

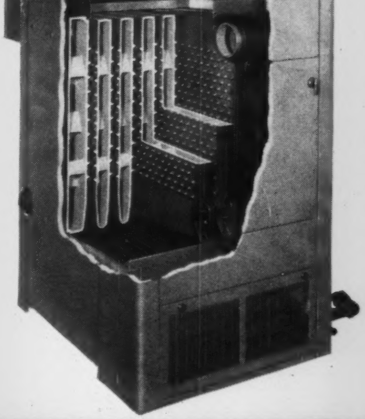
selected for this modernizing installation?



AFTER

HEATING CONTRACTOR:
Holwerda Huizinga, Grand Rapids, Michigan

DISTRIBUTOR:
Richards Mfg. Co., Grand Rapids, Michigan



The photos above tell part of the story, without need for further comment.

What they don't show are the built-in "Extra Values" which make the Weil-McLain Type "J" Gas Boiler an outstanding automatic heat producer.

This sectional *cast iron* boiler is distinguished by a long list of features which enable it to perform economically, year after year. Note its space saving compactness—particularly the low head room required. Assembly with short, multiple draw-rods shortens erection time—assures a strain-free boiler. Its handsome jacket is completely insulated.

Now available for use with the Weil-McLain Type "J" Boiler is a new pre-wired, electronic control panel which cuts installation time and assures correct boiler operation. New "Easy-Fit" Headers, machined and pre-fitted at the factory, are also available to provide all the advantages of a swing header without added erection costs.

WEIL-McLAIN
BOILERS · RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

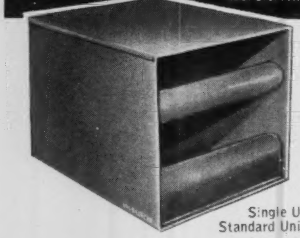
Address literature requests to Dept. AA-117

COMPACT . . . LIGHTWEIGHT . . . STREAMLINED AND ACOUSTICALLY EFFICIENT

NO JOB WAITS FOR

UNI-SILENCER

REG. U.S. PAT. OFF.

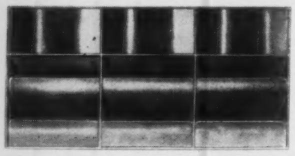


Single Unit
Standard Uni-Silencer

THE NEW SILENCER FOR AIR CONDITIONING AND VENTILATING SYSTEMS

UNI-SILENCERS* and UNI-RESONATORS* have been designed specifically to reduce the airborne noise generated by fans in industrial ventilating and air conditioning systems. Low in cost from both the original purchase and installation view, Uni-Silencers are delivered in cartons weighing about 75 lbs each. They may be easily and inexpensively transported into the building, to the specific location required.

UNI-SILENCERS* compare favorably in cost with conventional duct lining.



Uni-Silencer singles and half units set together

When air flow, pressure drop, or noise attenuation require the use of more than one Uni-Silencer, then units (singles, halfs or quarters) may be set together using built-in slip joints. Thus in series, or in parallel Uni-Silencers will fit any condition or requirement.

UNI-SILENCERS* are supplied in 3 sizes: Full Unit-24x24x32": Half Unit-12x24x32": Quarter Unit-12x12x32".

UNI-SILENCERS* are sold on a guaranteed basis. Interior and exterior surfaces are smooth, made of perforated and unperforated metal to reduce resistance to a minimum.

Complete engineering services are yours, FREE!

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*Reg. U. S. Pat. Off.

ELOF HANSSON, INC., Acoustical Division
711 Third Avenue, New York 17, N.Y.
Dept. U1

Please send complete literature on Uni-Silencers and Uni-Resonators, without charge or obligation.

NAME ....

ADDRESS ....

CITY ...... **ZONE** .... **STATE** ......

RECENT TRADE LITERATURE

Continued

Tubing samples include large, small diameter; heavy, thin wall. *Allied Chemical & Dye Corp., Barrett Div., Dept. HPAC, 40 Rector St., New York* 6.

▶ *PLASTIC*—New bulletin 803 describes plastic which weighs one-sixth as much as steel, one-half as much as aluminum. It will not support combustion, is nonmagnetic and nonsparking, imparts no odors or tastes, resists weathering, is easy to fabricate and to install, company says. *Joseph T. Ryerson & Son, Inc., Dept. HPAC, Box 8000-A, Chicago* 80.

▶ *PLASTIC PROTECTORS*—Plastic plugs, caps for protecting internal, external threaded parts, ends of tubes, etc. described in new 18 page catalog P-5708. Major plug, cap designs for "Quality," "Economy" lines covered in individual sections with specifications in table form. More than 100 illustrations, drawings included. *S. S. White Plastics Div., Dept. HPAC, 10 E. 40th St., New York* 16.

▶ *POWER PACKS*—New 4 page brochure 8-425 describes two new hydraulic power packs for operating two and four fastener installation tools, respectively. Models have 220-440 volt induction constant speed type motors rated 10, 15 hp; high pressure, dual vane type pumps driven through flexible couplings designed to prevent shock overload; flow controls, relief valves; high pressure filters; heat exchangers. Illustrations included. *Huck Mfg. Co., Dept. HPAC, 2480 Bellevue Ave., Detroit* 7.

▶ *PRIMARY CONTROL*—New brochure describes "PerfXray" primary control which is mounted on oil burners. Features of units, drawings, wiring diagrams included. Advan-

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There are 12 sound reasons why you should try:

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LAGGING ADHESIVE

There is an improved way to apply insulation. Whether you're bonding insulation to piping or adhering lagging cloth to insulation, Swift's Lagging Adhesives give you 12 important advantages:

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That is why the present tasks of our colleges and universities are of vital concern to *every* American. These institutions are doing their utmost to raise their teaching standards, to meet the steadily rising pressure for enrollment, and provide the healthy educational climate in which great ideas may flourish.

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PERMANENT Air Filter

SARAN Bonded-Hair Medium does the work of wire filters. No outside maintenance service needed.

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Permanent Dry Type Water Washable Filter

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Economy PLUS

National Representatives PEDEN EQUIPMENT CO.
4512 Mt. Vernon, Houston, Texas

RECENT TRADE LITERATURE

Continued

tages cited by company. *General Controls Co., Dept. HPAC, 801 Allen Ave., Glendale, Calif.*

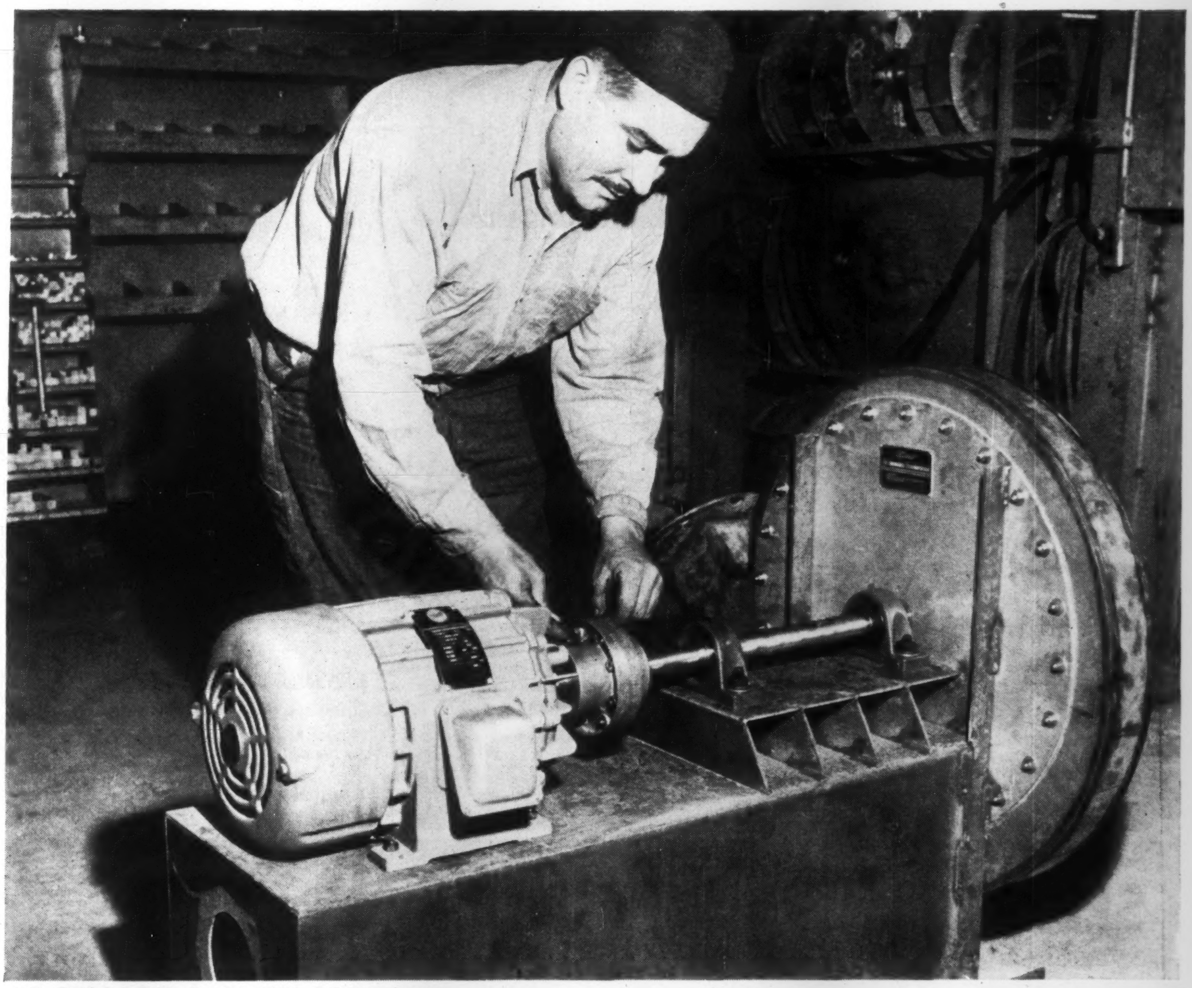
▶ *MOTOR SERVICE STATIONS*—New bulletin lists motor, generator service stations throughout the United States and Canada. How service can be utilized explained. *Marathon Electric Mfg. Corp., Dept. HPAC, Wausau, Wis.*

▶ *SOLDERING CHART*—Reference chart for soldering applications offers list of high purity elements. Purity given of each element available. *Anchor Metal Co., Inc., Dept. HPAC, 966 Meeker Ave., Brooklyn 22.*

▶ *SOLENOID VALVES*—New catalog 30-10 describes company's line of solenoid valves. General information, capacities, specifications, installation, service, special applications provided. Facts, figures concerning solenoid pilot control also included. *Sporlan Valve Co., Dept. HPAC, 7525 Sussex Ave., St. Louis 17.*

▶ *STACK SPRAYS*—New 4 page booklet 500-330 entitled *Stack Sprays to Reduce Dust Emission During Soot Blowing* discusses laboratory, field tests showing that water spray can reduce dust emission from boiler stacks during soot blowing, fire cleaning periods. Information includes amount of water required, selection of spray nozzle, operation of stack spray for best results, automatic controls. *Bituminous Coal Research, Inc., Dept. HPAC, 121 Meyran Ave., Pittsburgh 13.*

▶ *STAINLESS STEEL*—New 138 page catalog contains information on company's line of stainless steel and nylon fastenings, including bolts, nuts, screws, washers, etc. Specifications for product line supplied.



AT CHICAGO BLOWER COMPANY

DIEHL motors increase product acceptance

To back up their reputation for first-quality design and workmanship in the manufacture of heating ventilating, air-conditioning and exhaust systems, Chicago Blower Company Chicago, Ill., relies on top-flight manufacturers for certain equipment components

"Insofar as the all-important power drive is concerned", says Chicago Blower's President, Fred H. Gohl," . . . we feel we are giving our customers the very best when we give them a DIEHL motor."

In more than ten years of DIEHL motor use, Mr. Gohl knows of no instance in which there has been a failure. And he is enthusiastic about the nationwide chain of DIEHL authorized service stations which are never farther away than the nearest telephone if maintenance or repairs should be needed. These two factors, he says, have definitely contributed to the increased acceptance of their products and explains why Chicago Blower is a consistent user of DIEHL motors.

This is another example of how a forward-looking manufacturer turned to DIEHL for help in building equipment of superior design and performance. With almost three-quarters of a century of experience in producing better motors for varied classes of industry, DIEHL will gladly help you meet *your* motor needs. We will work closely with you to provide the right motor—at the right time—at the right price.

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Electrical Division of
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Finderne Plant, SOMERVILLE, N. J.

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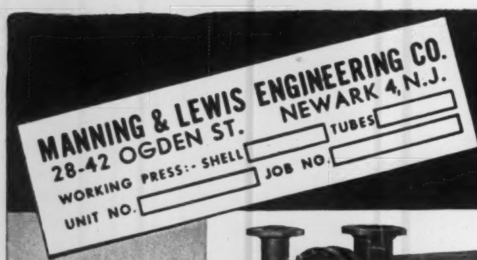
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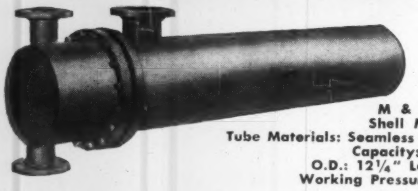

M & L CONVERTER
Shell Material: Steel
Tube Materials: Seamless Drawn Copper
Capacity: 13,200 g.p.h.
O.D.: 12¼" Length: 106½"
Working Pressures: 150 P.S.I.

The above unit is one of several M & L Converters now installed at Idlewild Airport in New York. They were designed and fabricated to furnish the heating system of a hangar with water at 140°F.

In order to meet exact specifications, minor changes were made in standard M & L Converters and one more successful installation went into the record.

Our long proven ability to design for a specific need has been extremely helpful in thousands of successful installations all over the country. This service is as near to you as your telephone.

For further details send for your copy of bulletin 780, or we will be happy to send a representative to assist you with any heating or cooling problem.

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SIZES - TYPES FOR ALL SERVICES

Mueller self-cleaning pipe line strainers are inexpensive protection for valves, meters, pumps, etc. Immediate delivery—all sizes from ¼" through 16" in stock. Use this low cost form of insurance in all your installations.

Write for bulletin AM giving complete data, prices, specifications, etc.

Mueller

STEAM SPECIALTY COMPANY, INC. 40-20 22nd St., Long Island City 1, N. Y.

RECENT TRADE LITERATURE

Continued

Service stock list also available that describes items used for emergency needs. *Anti-Corrosive Metal Products Co., Inc., Dept. HPAC, Castleton on Hudson, New York.*

▶ *STEAM HEATING COILS*—New 26 page booklet B-1710 has pictures, descriptions of commercial, industrial coils. Particular units discussed are blast heating, distributing tube heating, dual feed distributing tube, zone heating booster coils. Piping diagrams, performance charts, selection tables provided. *Westinghouse Sturtevant Div., Dept. HPAC, 200 Readville St., Hyde Park, Boston 36.*

▶ *TAPE*—Variety of uses for pressure sensitive tape described, illustrated in new 4 page booklet 57-TTI. Tested and used in extreme tropical weather conditions, company says. Tape samples included. *Tropical Tape Div., Dept. HPAC, 899 Country Club Circle, Fort Lauderdale, Fla.*

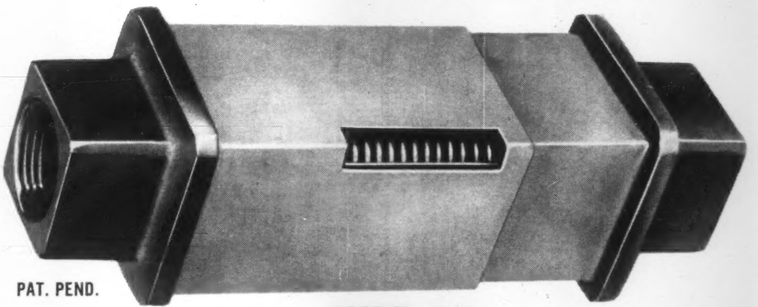
▶ *TEMPERATURE CONTROLS*—Illustrated 4 page bulletin discusses combined application of "Electrionic" temperature controls, "Uni Flo" air distribution products. By closely coordinating functions of two products, company says it has developed system that assures proper relationship of air velocities and temperatures producing constant uniform comfort from air conditioning systems. *Barber-Colman Co., Dept. HPAC, Rockford, Ill.*

▶ *THERMOMETERS*—New 4 page folder gives details of two types of metal probe thermometers showing various configurations in which they are available. Integral probe type has electrical indicating instrument mounted directly on rigid probe. Remote probe type has indicating instrument in anodized aluminum case

KEFLEX QUADRA-SIDE

Telescopic Expansion Compensators

WITH LAMINATED STAINLESS STEEL BELLOWS, 2 PLY OR MORE
SOMETHING NEW FOR THE
OWNER — ARCHITECT — ENGINEER — CONTRACTOR



PAT. PEND.

TYPE 7Q

SIZES ¾"-3" Inc.

Working Pressure 300 P.S.I. — Temperature to 800°F. — Has Reserve Strength — Not Just Borderline Prospect of Withstanding Effect of Pressure — Shock — Thermal Line Expansion — High Temperature — Moderate Vibration. HIDDEN PROTECTION PLUS! All Non Corrosive Stainless Steel Bellows With Brass or Bronze End Fittings and Telescopic Shrouds.

ROUND

KEFLEX Bellows are made of Laminated Stainless Steel, multiple ply (usually 2 ply or more) for greater strength with minimum force required to move bellows. The minimum force to move 7 Q Keflex Bellows greatly reduces the need for additional anchoring above that required to handle line pressure thrust force as the force to move Keflex 7 Q only is always less than 100 lbs.

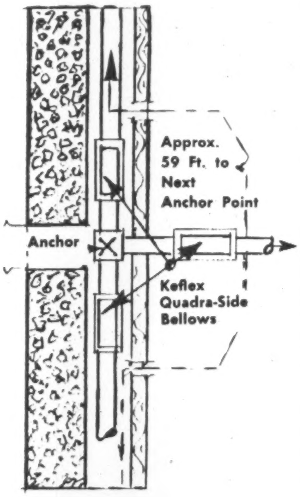
FLAT

KEFLEX FLAT GUIDES offer so many advantages it is difficult to mention them all. Briefly: The KEFLEX FLAT OUTSIDE GUIDE (shroud) is made of brass USUALLY formed square of required length — one unit end will telescope over other unit end. The flat surfaces slide over and in one another — practically eliminating possibility of torque as result of faulty installation. This ASSISTS PROPER GUIDING.

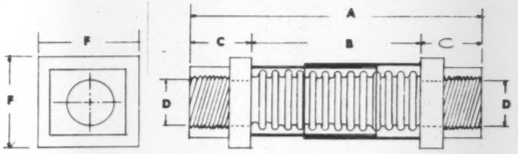
SQUARE

KEFLEX SQUARE END FITTINGS are made of heavy, non-porous, square, bronze stock, and threaded tapered female pipe size. They are attached to the KEFLEX 7 Q bellows and the outside guides by silver brazing. The result is an easy moving expansion joint that will absorb either the slightest or the greatest thermal pipe expansion and with practically no load on the anchors. The heavy bronze ends, which will not crush during normal installations, assures safe and leakproof joints.

KEFLEX FITS IN NARROWEST WALL SPACE—SAFE—PERMANENT


Approx. 59 Ft. to Next Anchor Point
Anchor
Keflex Quadra-Side Bellows

KEFLEX DATA

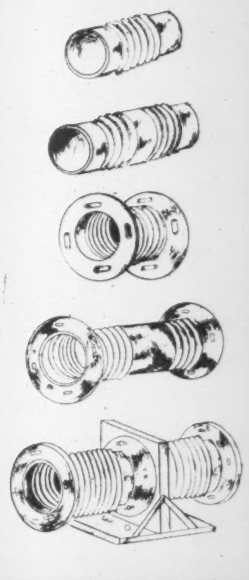


AXIAL TRAVEL

For: ¾" For: 1.50"

D Nom. I.P.S.	A Overall Length	A Overall Length	B Live Length	C Coup. Len.	F Max. O.D.
¾-1.00-1.25"	4.50"	6.50"	4.00"	1.25"	2.00"
1.50"	4.50	6.50	4.00	1.25	2.50
2.00	4.50	6.50	4.00	1.25	3.00
2.50	4.50	6.50	4.00	1.25	3.50
3.00	4.50	6.50	4.00	1.25	4.00

KEFLEX®



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SINCE 1905

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Babbitt

Adjustable
SPROCKET RIM
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- Easy to install and operate
- Operates any valve from plant floor
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- No maintenance, first cost only cost
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- Easy to follow instructions with each unit
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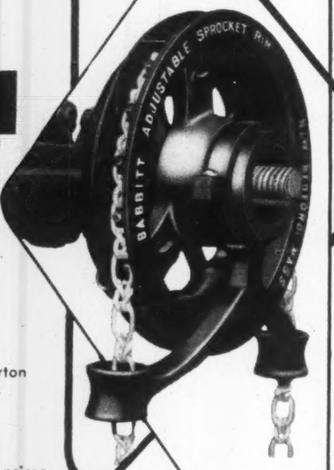
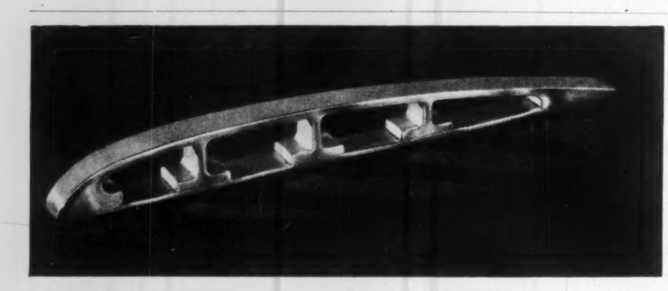
- Write for new descriptive catalog sheet and prices



Babbitt STEAM SPECIALTY CO.
8 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.



Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9′ to 22′.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal . . . Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue . . . true airfoil blade sections assure maximum air delivery . . . adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6811 Scott Street, Baltimore 3, Maryland.

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Aeromaster Fans
Engineered Products Sold with Service

*Koppers Trademark

RECENT TRADE LITERATURE

Continued

with probe located at end of flexible cable. Details, specifications, illustrations included. Range of various scales given. *Royco Instruments, Dept. HPAC, 720 Arthur St., Albany 10, Calif.*

▶ *TUBULAR PRODUCTS*—New 4 page brochure TDC-153B presents stress rupture data on tubing steels used at elevated temperatures, pressures. Results of rupture tests on 14 steels including carbon, several alloys, 10 different stainless steels given. Testing temperatures range 850 F through 1800 F. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *TUBULAR PRODUCTS*—New 12 page booklet offers history, operations, research facilities of company which manufactures tubular products for air conditioning, refrigeration industries. Water finned, copper refrigeration tubes described. More than 25 illustrations included. *Wolverine Tube, Div. of Calumet & Hecla, Inc., Dept. HPAC, 17200 Southfield Rd., Allen Park, Mich.*

▶ *UNIT HEATERS*—New 26 page catalog describes commercial, industrial unit heaters. Tabular performance data given for steam, hot water units. Details of construction, specifications, applications, diagrams, illustrations included. *Westinghouse Electric Corp., Sturtevant Div., Dept. HPAC, Hyde Park, Boston 36.*

▶ *VALVES*—New 4 page booklet G5 describes various piping, valve arrangements for particular applications. Valves used in supplying water to mills or cities, in controlling water levels, in emergency fire protection discussed. Illustrations included. *Golden-Anderson Valve Specialty Co., Dept. HPAC, 1210 Ridge Ave., Pittsburgh 33.*

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AIR CONDITIONING AND REFRIGERATION

TEMPERATURE LIMITED

BURLINGTON ROAD, LONDON, S.W.6, ENGLAND
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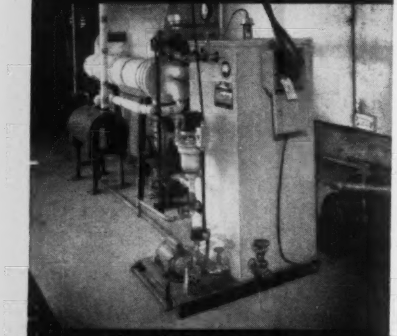
LARGEST PRODUCER OF

AIR CONDITIONING UNITS OUTSIDE THE U.S.A.

Pantex SPEEDYLECTRIC STEAM GENERATOR



Ideal Answer to
10 PROBLEMS
in Supplying Steam

- Without flame, flues or stack
- At higher pressures or temperatures
- At adjustable pressure or temperature
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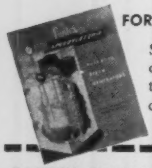
- Without long steam lines
- To serve summer processing needs
- To meet extra load needs
- For lab, test, or pilot-plant use
- Where an unattended boiler is desired
- Where boiler space is limited

In many such situations, a Speedylectric Steam Generator is the best or only solution. Using the electrode method of generating steam electrically, completely safe anywhere, its design eliminates low-water hazard and practically removes the need for supervision. Generation is fast, by the simplest and most economical electric method, and adjusts automatically to meet load demand. Upkeep is nil . . . there are no coils, tubes or heating elements to scale or burn out. Sizes from 2 to 50 Bhp, 15 to 500 psi. Higher pressures are available. Electric power 220, 440, or 550 volts A. C. UL listed, ASME code.



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RECENT TRADE LITERATURE

Continued

▶ *VALVES*—New 4 page brochure has information on "Econ-O-Miser" valve that serves as both a valve and a union. Unit designed for economical installation, longer operating life, low cost maintenance, company says. Dimension chart included. *Worcester Valve Co., Inc., Dept. HPAC, 16 Parker St., Worcester, Mass.*

▶ *VALVES, CONTROLS*—New 20 page catalog 1687 offers details, specifications, operational features of new system of valves, controls for automatic operation of heat pumps. "D50" automatic de-icer operates solely on accumulation of ice on outside coils, removes ice and automatically returns heat pump to heating phase in 3 to 5 min, company says. "V25," "V26" slide type reversing valves in capacities through 7½ tons in 24, 115, 208, 230 volt solenoids described. *Ranco, Inc., Dept. HPAC, 601 W. Fifth Ave., Columbus, Ohio.*

▶ *V-BELT*—New 2 page bulletin available on "Vibrasorb" v-belt. Company says belt reduces vibration and noise by absorbing it before it reaches machine. How unit can be adopted for air conditioning units, forced air furnaces, window, attic fans, etc. described by manufacturer. *B. F. Goodrich Industrial Products Co., Dept. HPAC, Akron, Ohio.*

▶ *V-BELTS, HOSE, ROPES*—Case histories of firms using company's v-belts, hose, ropes described in new 4 page brochure. Features, according to company: longer life resulting in cost saving, less "downtime" to users. *Gates Rubber Co., Dept. HPAC, 999 S. Broadway, Denver 17.*

▶ *VENTILATORS*—New direct drive centrifugal roof ventilators highlighted in 12 page bulletin SDA-220. Features, construction details, ratings, performance data, dimen-

Outstanding Accuracy
PALMER
Dial Thermometer

100
120
140
80
160
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PALMER
180
40
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°F
220
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240
PALMER THERMOMETERS, INC. CINCINNATI, O. U.S.A.

MODEL 1035

FITS ALL BI-METALLIC WELLS

Check these functional features

- Direct-drive Bourdon Coil with a filled system for longer lasting accuracy.
- Stem can be placed at any desired angle and case can be rotated to most readable position.
- External calibration for zero setting.
- Unaffected by stem alignment.
- Accurate to one scale division.
- No sticking at any temperature.
- Non-corrosive case.

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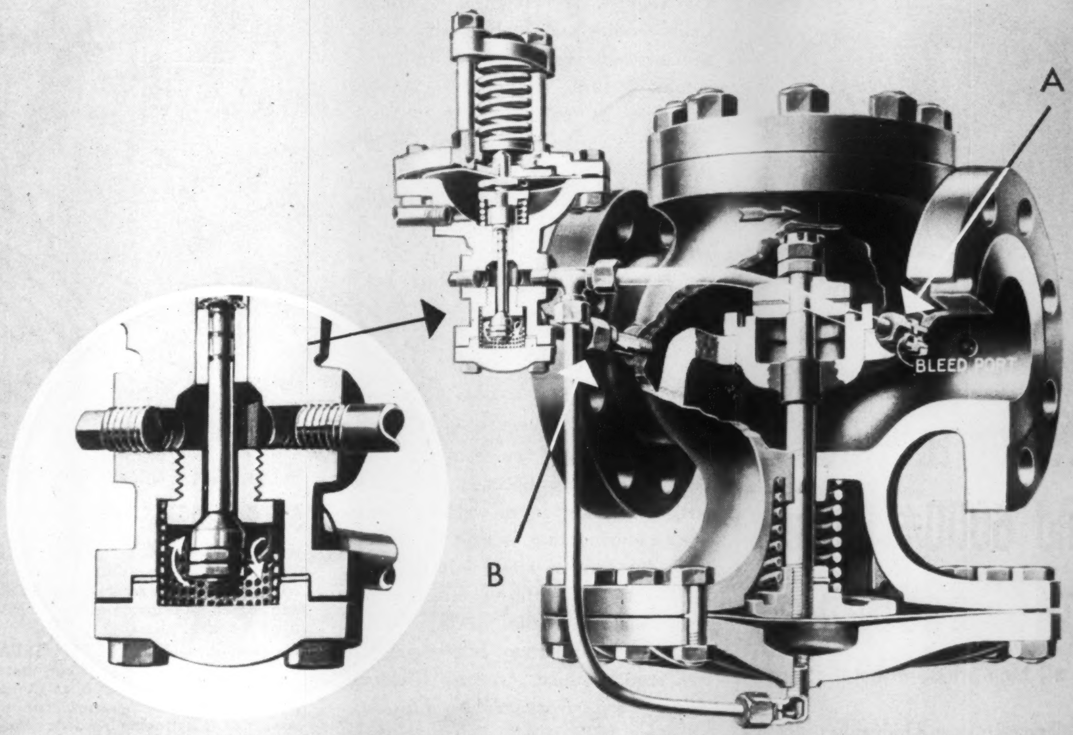
Mfrs. of Industrial Laboratory, Recording and Dial Thermometers
2515 Norwood Ave., Cincinnati 12, O.

VALVE TIPS:

Advantages of External Pilots in Automatic Regulating Valves



Spence Type ED Pressure Regulator

"Maintenance-free, trouble-free, install-and-forget." They're all pretty phrases, but every engineer knows from experience they don't apply to regulating valves. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines.

One advantage of the external pilot mounting shown above is simplified maintenance. Trouble shooting is faster, downtime is reduced, and tempers don't take such a beating. Here's why:

If trouble develops, it's easy to find out if it's in the pilot or the main valve. Just remove the tubing bend at A. A simple test, without any instruments or other equipment, shows where the trouble is.

If the trouble is in the pilot, you can remove it by disconnecting the unions at B. There's no need to take the main valve out of the line.

The quickest way to get the regulator functioning again is to install a spare pilot. This is easy — and in the Spence design it's not expensive to carry spare pilots. Spence pilots fit all sizes of Spence main valves. There's no need to stock an expensive inventory of pilots for each main valve size.

In the enlarged sectional drawing above, you can see how the strainer, seat and disc of the pilot are readily accessible by removing the blind flange.

If the trouble is in the main valve, here again inspection is easy. If there's dirt in the steam line, it may clog the bleed port or restriction orifices. In the Spence design these can be inspected and cleaned by merely removing the tubing connections. The seat and disc of the main valve can also be inspected easily by removing the top flange.

These maintenance advantages, plus other advanced design features, are available for a wide range of regulating applications. For information on Spence's wide range of different automatic regulating valves, write for your copy of Bulletin 1005.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

for peace of mind when the *__pressure__ is on...*

...Capitol 3000# and 6000# forged steel couplings

for all high-pressure installations

Full couplings and half couplings are available from stock for prompt shipment in all sizes from 1/8" through 4".

Manufactured to ASTM Specifications A-105.

ORDER EVERY TYPE OF COUPLING FROM

CAP CAPITOL MFG. & SUPPLY CO.
COLUMBUS, OHIO

COUPLINGS — NIPPLES — UNIONS — BUSHINGS — PLUGS — REDUCERS — CAPS—CAPADAPTERS—WELL SUPPLIES

RECENT TRADE LITERATURE

Continued

sions on belt, direct drive models offered. Illustrations, line drawings, tables, charts, graphs included. *Peerless Electric Co., Dept. HPAC, Warren, Ohio.*

▶ *WELDING BLOWPIPE*—New 8 page brochure 1107 describes "Oxweld W-47" welding blowpipe. Unit capable of welding any metal thickness 28 gage sheet to 3 in. plate, company says. Designed to handle gas flows as low as 2 cfh precision welding, or total flows to 1500 cfh for heavy heating operations. Performance data on welding heads, cutting nozzles included. *Linde Co., Div. of Union Carbide Corp., Dept. HPAC,* 30 *E. 42nd St., New York* 17.

▶ *WELDING EQUIPMENT*—New 8 page booklet explores welding problems encountered on common base metals. Company discusses new methods of low heat input welding, brazing, soldering that is said to reduce time duration of metal joining jobs. Procedures of welding crack sensitive, heat treatable steels; filling, sealing, building up heat sensitive cast iron outlined. *Eutectic Welding Alloys Corp., Dept. HPAC, Flushing* 58, *New York.*

▶ *WELDING SUPPLIES* — Automatic electrodes, fluxes for submerged arc welding and hardsurfacing covered in bulletin SB-1354. Presented are illustrations, charts, diagrams. *Lincoln Electric Co., Dept. HPAC,* 22801 *St. Clair Ave., Cleveland* 17.

▶ *WIRE, ROD, STRIP* — Catalog No. 12, 35 pages, is technical handbook on wire, rod, strip. Data given on chemical, physical, mechanical properties of various alloys. *Techalloy Co., Inc., Dept. HPAC, Rahns, Pa.* +

ATTENTION DES MOINES!

Iowan eliminates Mr. Entropy* — stops steam waste with SELECTOTHERM

Around Des Moines, Don Wells, 312 Home Federal Building, is well-known for getting rid of steam waste in schools and other buildings where boilers are used for steam heating.

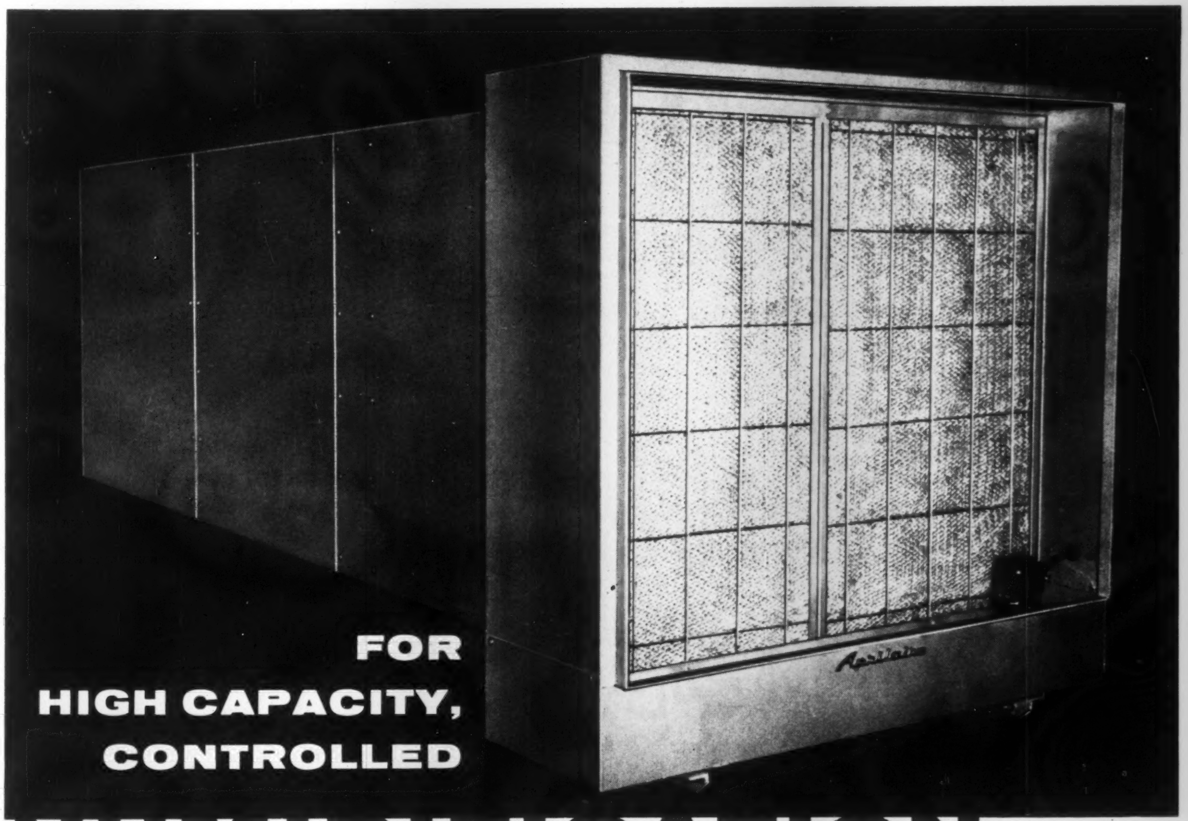
He does it with SELECTOTHERM, the high-vacuum heating system that automatically provides steam at the proper pressure and temperature for perfect comfort. Installation records show that SELECTOTHERM cuts the fuel bill 19% or more — *enough to pay for the system within five years!*

SELECTOTHERM applies the control directly to the boiler, adds to the effectiveness of unit ventilators and individual room control. Get the whole story. If you're from the Des Moines area, call Don at Products, Inc. (ATlantic 8-5739). If not, write for fact-filled SELECTOTHERM booklet, *Boiler Room Ballad.*

* *Mr. Entropy represents the heat that is produced but unavailable for use.*

SELECTOTHERM
HEATING CONTROL SYSTEM ®

A product of Illinois Engineering Co.
Division of American Air Filter Co., Inc.
2035 South Racine Ave., Chicago 8, Ill.



FOR HIGH CAPACITY, CONTROLLED

HUMIDIFICATION

RP *Aprilaire*

AUTOMATIC-ELECTRIC HUMIDIFIERS

HIGH CAPACITY

Aprilaire Industrial Humidifiers (illustrated) are designed to provide capacity for practically any size requirements. Unit sizes up to 10 G.P.H.—can be installed singly or in a series of any number of units.

POSITIVE CONTROL

The Aprilaire introduces relative humidity as needed ...and only when needed. Automatic control eliminates possibility of lag or over-run.

FLEXIBILITY

Aprilaire industrial models are available for gas, steam or hot water heat source. Every model can be pedestal-mounted or suspended—according to individual requirements.

BACTERIA REMOVAL

The Aprilaire's entirely new principle of humidification, introducing humidity as a water vapor, provides an important plus feature—the removal of up to 70% of all bacteria in the air stream circulating through the unit.

ISOTHERMAL OPERATION

The Industrial Aprilaire has no temperature effect on the humidified air. Exhausted, humidified air is discharged at the same temperature it enters the unit.

MINIMUM MAINTENANCE

Because the only liming or water solids deposits occur on the inexpensive, replaceable evaporating pads... mechanical difficulties from these usually troublesome deposits are eliminated.

INDUSTRIAL AND RESIDENTIAL MODELS AVAILABLE-WRITE FOR COMPLETE INFORMATION

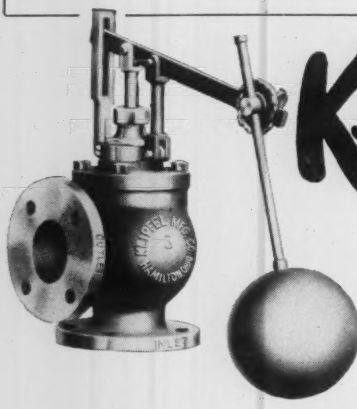
see our catalog in
S
PLANT ENGINEERING FILE
or write for copy

RP . . . PRODUCTS OF RESEARCH

RESEARCH PRODUCTS *Corporation*
Dept. 912, Madison 10, Wisconsin

to keep liquids

ON-THE-LEVEL



Klipfel

FLOAT VALVES

- Really automatic liquid level control . . . proven by a 40-year record of dependability in thousands of installations, large and small, water and chemical.
- Direct acting or pilot control types . . . single or double seated . . . for every possible requirement of pressure, temperature, fluid and closure.
- Also available with Klipfel's exclusive cup disc inner valve for tight control of liquids injurious to rubber and leather, and for higher pressures.

Get all the facts today on versatile Klipfel Float Valves. Write for catalog #254.

- FLOAT VALVES
- REDUCING VALVES
- BACK PRESSURE VALVES
- TANK THERMOSTATS

Klipfel VALVES, INC.

Division of Hamilton-Thomas Corp.
Dept. C-11, Hamilton, Ohio

Export Dept. — 1010 Schaff Bldg., Philadelphia, Pa.

WHO'S WHAT . . .

(New personnel, promotions)

▶ *AMERICAN GAS ASSOCIATION* — Robert W. Otto, A. W. Conover, and J. Theodore Wolfe, nominated as president, first vice president, and second vice president, respectively. Vincent T. Miles has been renominated as treasurer. Ralbern H. Murray, secretary of the industrial and commercial gas section. He succeeds Mahlon A. Combs.

▶ *WESTERN AIR CONDITIONING INDUSTRIES ASSOCIATION*—William P. Tennity, president; Arthur Hess, vice president; Fred J. Tabery, secretary-treasurer. Board members are Peter H. Askew, W. W. Allison, Richard Farr, R. E. Harkens, George Hatch, E. L. Nelson, D. E. Reznick, Robert H. Savage, Henry C. Ulovec, Robert Warden.

▶ *AIR MOVING & CONDITIONING ASSOCIATION, INC.*—Marshall F. Allen, executive vice president. He succeeds L. O. Monroe who has retired. Six directors elected for one year are L. Macrow, R. A. Wasson, E. J. Stone, W. A. Curtis, Wallace Allen, Jr., and J. J. Merrick. Directors at large elected for one year are W. H. Rietz, J. W. Wilcock, and C. W. Lockhart.

▶ *BARRY BLOWER CO.*—L. P. Hanson, sales manager.

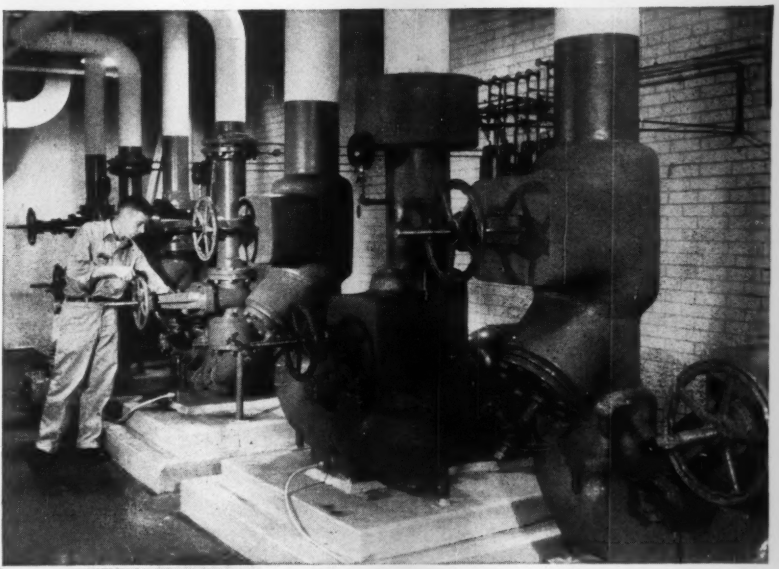
▶ *OIL-HEAT INSTITUTE OF AMERICA, INC.* — Board members are Robert Andler, D. A. Campbell, J. Eubanks, H. L. Mandelburg, H. McClure, and W. D. Wood.

▶ *YUBA INDUSTRIES, INC.* — W. E. Brockel, vice president, engineering; R. A. Beck, vice president in charge of sales; N. S. Livingston, vice president. All are executives in the heat transfer division.

▶ *PITTSBURGH PLATE GLASS CO.* — Edwin T. Asplundh, board chairman; Felix T. Hughes, vice president of merchandising division.

▶ *OLIN MATHIESON CHEMICAL CORP., WESTERN BRASS MILLS DIV.* — George A. Chandler, manager; Melvin L. Henry, production manager; John F. Hack, customer service manager for fabricated products.

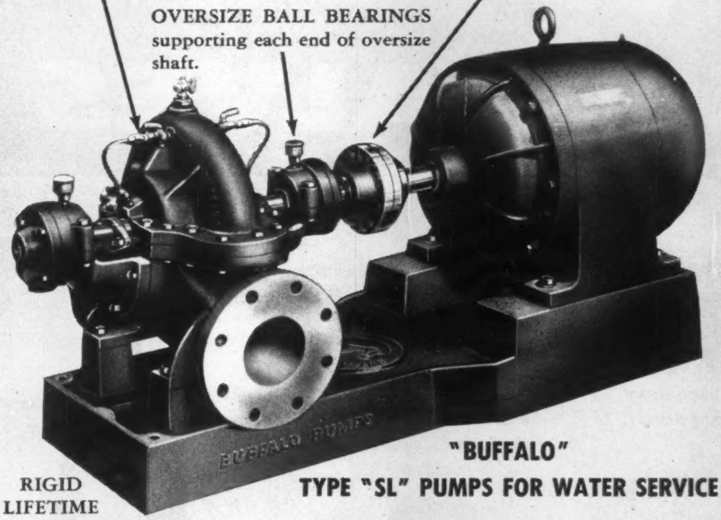
THE INSTALLATION CAN FUNCTION NO BETTER THAN ITS PUMPS —



AMPLE, HUSKY CASING has large, simply formed passages for minimum friction and hydraulic balance. Horizontally split for quick removal of upper half of casing without disturbing piping.

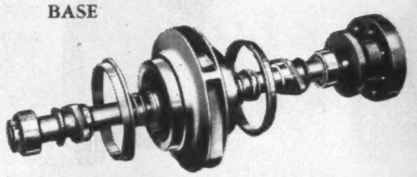
STURDY PIN-AND-RUBBER BUSHING COUPLING for flexibility and strength to carry maximum loads.

OVERSIZE BALL BEARINGS supporting each end of oversize shaft.



"BUFFALO" TYPE "SL" PUMPS FOR WATER SERVICE

RIGID LIFETIME BASE



IMPELLER AND SHAFT CONSTRUCTION has precision hydraulically balanced impeller of the most efficient enclosed design. Note bronze wearing rings, heavy duty bearings and large diameter shaft.

— WHY NOT PICK THE BEST?

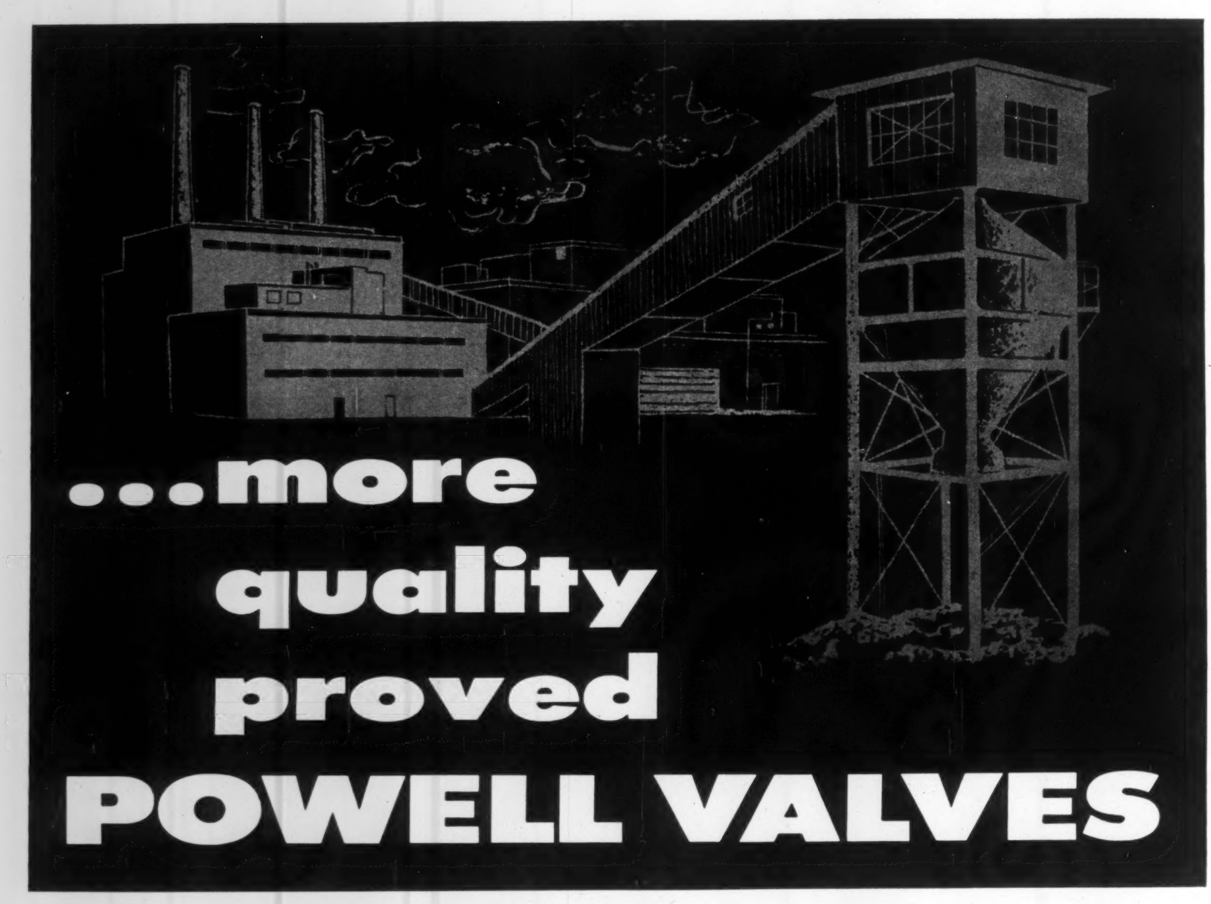
The pump is generally the least costly item in a job like the above installation, supplying chilled water for air conditioning a large store — yet it's no place for pump troubles! The contractor took no chances. He specified "Buffalo" Double Suction.

A look at the "Buffalo" features at left will indicate what we mean by "best". Literally, from impeller to coupling, it incorporates the finest obtainable materials with the best hydraulic design of our 80 years in the business. The "Buffalo" engineering and manufacturing departments have "gone the limit" to make available to you a pump that will live up in every way to the excellence of your finest installations. Bulletin 955 gives full engineering details — write for your copy!

"Buffalo" PUMPS

BUFFALO PUMPS
DIVISION OF BUFFALO FORGE COMPANY
171 MORTIMER ST. • BUFFALO, N. Y.
Canada Pumps, Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



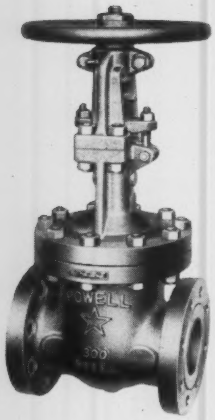


Fig. 3003—Steel O.S.& Y. Gate Valve for 300 Pounds W.S.P.

FIG. 375—Bronze Gate Valve for 200 Pounds W.S.P. Union bonnet and inside screw rising stem.

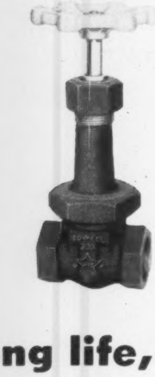
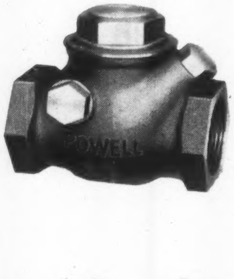
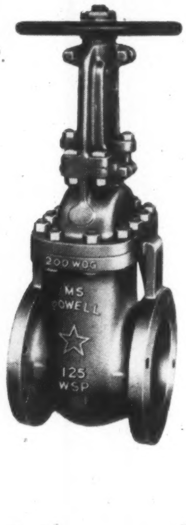


FIG. 1793—Iron Body Bronze Mounted O. S.& Y. Gate Valve for 125 Pounds W.S.P.

FIG. 560—Bronze Regrinding Horizontal Swing Check Valve for 200 Pounds W.S.P.





Designed for long life, designed for dependable service

Consult your Powell Valve distributor for all the facts about quality proved bronze, iron, steel and corrosion-resistant valves. For every flow problem . . . there is a Powell Valve to solve it.

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

WHO'S WHAT

Continued

▶ *TRION, INC.*—Dick S. Ashcom, Jr., controller and office manager.

▶ *YOUNGSTOWN SHEET AND TUBE CO.*—Ed O. Reese, manager; John H. Stone, general superintendent, both in the Youngstown district.

▶ *CHASE BRASS & COPPER CO.* — Charles L. Denehy, production control manager at Cleveland mill; Thomas M. Rianhard, production control manager at metal works; Kenneth J. McNeill, superintendent of sheet mill at Waterville, Conn.

▶ *BLACK & DECKER MFG. CO.* — John M. Fox, Hampstead plant manager; Karl B. Salanda, director of industrial and plant engineering; William B. Ford, Jr., Towson plant manager.

▶ *MUELLER CLIMATROL* — Richard B. Schmidt, sales promotion manager; William S. Malloy, personnel manager.

▶ *H. D. CONKEY & CO.* — Harry J. Potter, sales manager in field control division.

▶ *E. I. DU PONT DE NEMOURS AND CO.* — William A. Bours, III, director of sales at company's "Freon" products division; Thomas D. Johnson, Jr., assistant director of sales.

▶ *WARREN PUMPS, INC.* — Robert D. Rutter, supervisor of advertising.

▶ *ROBERTSHAW-FULTON CONTROLS CO.*—W. M. Watkins, Jr., sales manager of new seal division.

▶ *WILSON, HAIGHT, WELCH & GROVER, INC.* — Richard B. Connell, air conditioning sales manager.

▶ *GRISCOM-RUSSELL CO.* — Arvid Nihlen, engineer of manufacture.

▶ *BATTELLE MEMORIAL INSTITUTE* — Frederick W. Fink, chief of corrosion research division.

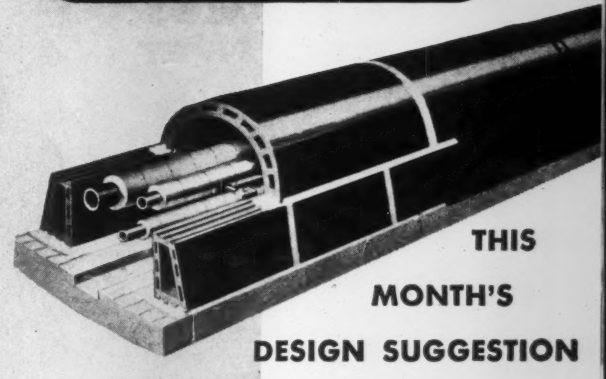
▶ *RUBEROID CO.* — Thomas A. Dent, director of engineering.

▶ *HENRY VALVE CO.* — Robert W. Carvell, sales supervisor of industrial division.

Therm-O-Tile

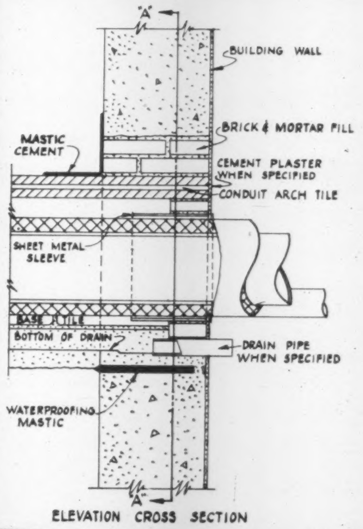
CONDUIT
FOR
UNDERGROUND
PIPING

• PERMANENT • ECONOMICAL
• SIMPLE • EFFICIENT



THIS
MONTH'S
DESIGN SUGGESTION

How Therm-O-Tile is passed through a Building Wall

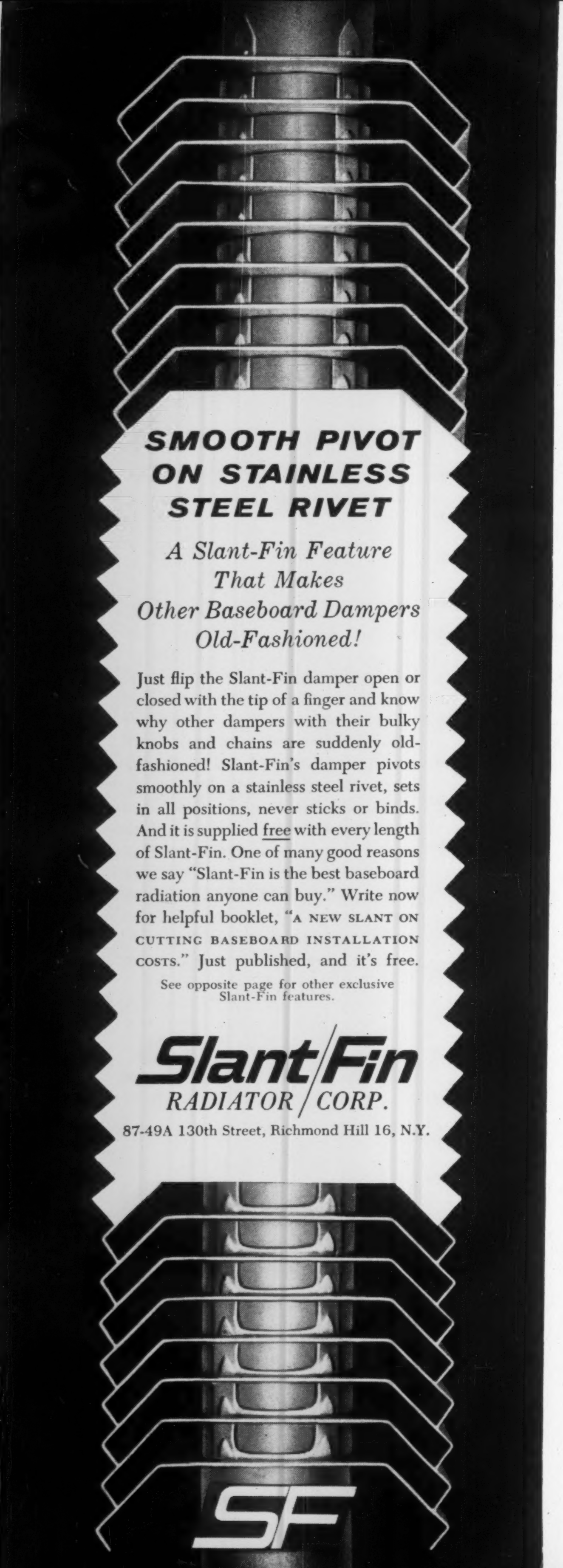


BUILDING
WALL
ENTRY

An elevation cross section showing how Therm-O-Tile Underground Pipe Conduit is made to pass through a building wall. The tile conduit and slab extends through the masonry wall with a brick shutter closure around the pipes and conduit.

FOR ADDITIONAL DESIGN DETAILS
AND GENERAL INFORMATION ASK FOR
Bulletin No. 9156

H. W. PORTER & CO., INC. • REID HAYDEN, INC.
822 Frelinghuysen Ave., Newark, N. J.
Baltimore, Md. Richmond, Va. Charlotte, N. C.
Insulation Engineers and Contractors



SMOOTH PIVOT ON STAINLESS STEEL RIVET

A Slant-Fin Feature That Makes Other Baseboard Dampers Old-Fashioned!

Just flip the Slant-Fin damper open or closed with the tip of a finger and know why other dampers with their bulky knobs and chains are suddenly old-fashioned! Slant-Fin's damper pivots smoothly on a stainless steel rivet, sets in all positions, never sticks or binds. And it is supplied free with every length of Slant-Fin. One of many good reasons we say "Slant-Fin is the best baseboard radiation anyone can buy." Write now for helpful booklet, "A NEW SLANT ON CUTTING BASEBOARD INSTALLATION COSTS." Just published, and it's free.

See opposite page for other exclusive Slant-Fin features.

Slant/Fin
RADIATOR / CORP.
87-49A 130th Street, Richmond Hill 16, N.Y.

SF

WHO'S WHAT

Continued

▶ *BABCOCK & WILCOX CO.* — John J. McDermott, production manager.

▶ *WESTON ELECTRICAL INSTRUMENT CORP.* — Richard E. Love, manager of recorders-controllers sales.

▶ *KEASBEY & MATTISON CO.* — Hanford Gruber, market research and sales training manager.

▶ *SIMPSON ELECTRIC CO.* — Frank Hadrick, chief field engineer.

▶ *YORK-SHIPLEY, INC.* — Gordon M. Parker, merchandising manager.

▶ *W-S FITTINGS DIV., H. K. PORTER CO., INC.* — James H. Wyres, sales manager.

▶ *A. M. BYERS CO.* — Robert J. Herpel, credit manager; C. R. Day, plant engineer, and Fred Engelhardt, director of purchases and traffic.

▶ *WARREN WEBSTER & CO.*—Miss Mary Ivins, credit manager. She succeeds Charles H. Grissom who has retired following 57 years of continuous service.

▶ *WHIRLPOOL CORP.* — John Seippel, sales and product training manager in air conditioning division.

▶ *EBCO MFG. CO.* — Elisha C. Pierce, assistant advertising manager.

▶ *DELAVAN MFG. CO.* — William Spargur, assistant sales manager.

▶ *ROCKWELL MFG. CO.* — John L. Leisenring, assistant gas products manager.

▶ *WHEELABRATOR CORP.* — John G. Farabaugh, director of industrial relations.

WHO'S WHAT

Continued

▶ *FEDDERS-QUIGAN CORP.* — Jerry Lansky, director of public relations.

▶ *RHEEM MFG. CO.* — Earl Kirmser, director of public relations.

▶ *AMANA REFRIGERATION, INC.* — Walter A. Wendler, vice president in charge of sales; Robert I. Pearce, sales manager.

▶ *RECOLD CORP.* — William M. Semple, works manager.

IN THE TERRITORIES . . .

(Recent sales appointments)

▶ *TRANE CO.* — Robert H. Owens and Gene Binning, managers of St. Paul, Oklahoma City offices, respectively. Earl B. Earle, service engineer at new southern center in New Orleans. Harry R. Deming, Anthony R. Marold, Thomas M. Elliott and Ralph C. Snow, sales engineers at Denver, Appleton, Wis., offices, and new Fort Wayne, Ind., San Diego, Calif., sub offices, respectively.

▶ *AIRTEMP CONSTRUCTION DIV., CHRYSLER CORP.* — Six new zones, with newly appointed managers, established to handle sales, engineering activities. They are: northeast, F. D. Halama; southeast, F. G. Kilburn; mid central, R. M. Hagan; southwest, W. F. Jeffers; north central, J. V. Weigle; west coast, manager to be appointed.

▶ *BUENSOD-STACEY, INC.* — Five sales representatives are Barnhart-Dwyer Co., Albuquerque, N. M.; Pedley Equipment Co., Charleston, W. Va.; E. K. Strahan Inc., New Orleans; H. Dewey Jones Co., Columbus, Ohio; General Equipment Co., Spokane, Wash.

▶ *ALLIS-CHALMERS MFG. CO.* — Robert B. Fulton, manager of new Dayton, Ohio, office; William F. Vander Mass, manager of Cincinnati district; James A. Sudduth, manager of Grand Rapids district. Hill Electric Air Conditioning, Inc., distributor in 10 central, southeastern Kansas counties.

▶ *BOHN ALUMINUM & BRASS CORP., BETZ DIV.* — Northwest Factors, representative in Pacific northwest.

TOUGHER TUBES

a Slant-Fin feature that insures longer service!

Baseboard tubes are usually joined to fins by expanding the tube and imbedding the fins into the thinned out tube wall. But Slant-Fin's exclusive method forces the tubing through an undersized hole in the fins. The tube is never expanded, thinned or weakened one bit. The result: full wall thickness in every Slant-Fin tube, longer service life in every Slant-Fin installation. Another reason we say "this is the best baseboard radiation anyone can buy." Write now for helpful booklet, "A NEW SLANT ON CUTTING BASEBOARD INSTALLATION COSTS." Just published, and it's free.

See opposite page for other exclusive Slant-Fin features.

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RADIATOR/CORP.
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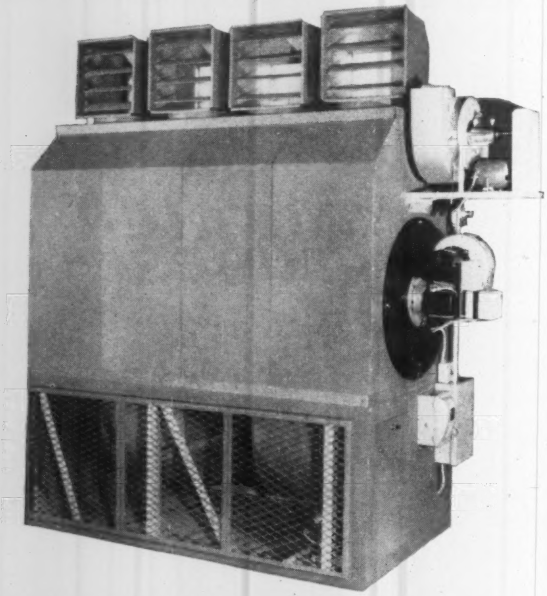
SF

Johnson

MODEL FA
Packaged Heating Units



HEATING VENTILATING
DRYING MAKE-UP AIR

DIRECT FIRED with
OIL, GAS or COMBINATION BURNER
FLOOR or SUSPENDED MODELS

SIZES FOR ALL COMMERCIAL & INDUSTRIAL APPLICATIONS • FOR USE WITH OR WITHOUT DUCTWORK

DESIGNED for
Low cost heating

JOHNSON MODEL "FA" Fyre-Tube HEATERS 400,000 to 3,000,000 BTU/hr output.

JOHNSON MODEL "JA" Aire-Tube HEATERS 110,000 to 5,000,000 BTU/hr output.

Write Today For Latest Catalogues And Engineering Data

Mail this coupon for information

Gentlemen:
We wish detailed information of Johnson Heaters as checked below.

Type Application you are considering
☐ SEND DATA ON COMPLETE LINE ....
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ADDRESS ....
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POSITION ....

JOHNSON HEATER CORP.
1 WINNISIMMET ST. CHELSEA 50, MASS.

WHO'S WHAT

Continued

FLEXIBLE TUBING CORP. — Stephen K. Hawkins, manager of central operations, Chicago area. He will serve Illinois, Indiana, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, North and South Dakota, southwestern Ohio, upper peninsula of Michigan.

AMERICAN AIR FILTER CO., INC. — Representatives are Kirk Cousart and Assoc. for Greensboro, N.C., area; Air Engineering Co., recently merged with Marshall & Wells Co., for Kalamazoo, Grand Rapids, Mich., South Bend, Ind., areas; C. W. Dean and Assoc. for Memphis area.

CHEMPUMP CORP. — Three representatives are Chemical Pump & Equipment Corp. for Chicago area; Tate Engineering, Inc. for Virginia territory; Process Sales Co. for Texas Gulf Coast region.

TUBE MANIFOLD CORP. — Row-Con, Inc., factory representative for molecular sieve filter-driers for Ohio, Indiana, Kentucky.

TUTHILL PUMP CO. — Phillips W. Berg, regional sales manager for Indiana, Michigan, Ohio, western Pennsylvania, Kentucky. Ernest Ritchie Co., representative for Rocky Mountain region of Colorado, Utah, Wyoming, New Mexico, southern Idaho.

OHIO ELECTRIC MFG. CO. — Charles N. Rapiport Assoc., sales representative for eastern, midwestern territories.

AUSTIN CO. — Michael P. Superak, district engineer in northern California; Brown W. Saveland, assistant district manager in Pacific northwest.

HUCK MFG. CO. — Bruce B. Wilson, representative for Alabama, northwest Florida, some Tennessee counties. Charles M. Reyle, representative for Florida.

THOR POWER TOOL CO. — A. V. Moroz and James P. Stine, managers of Chicago, New York branch offices, respectively.

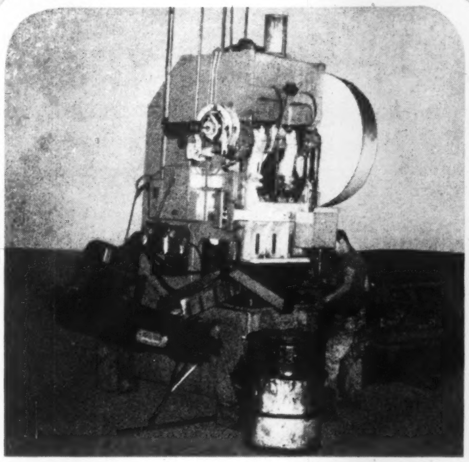
AUTOMATIC SWITCH CO. — Stocking distributor of "Asco" solenoid valves is Terco Equipment Co., San Francisco.

"WITCH"

PIPE HANGERS

FOR

HEATING – PLUMBING
POWER & PROCESS



The latest mass-production methods are used to manufacture uniformly high quality pipe hangers and supports at the lowest cost to the customer.

Our catalogue illustrates a complete line of Pipe Hangers & Supports and is an indispensable reference book for engineers, contractors, estimators & erectors. Write for your copy now.

"WITCH"
PIPE HANGERS AND SUPPORTS

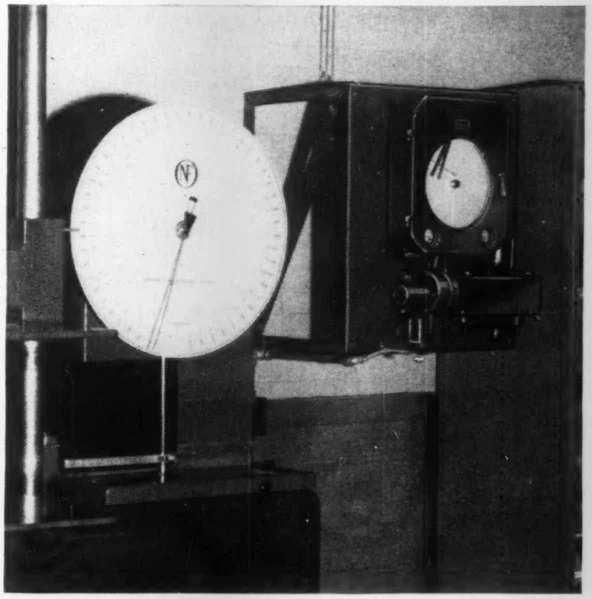
MAINTAINING OFFICES AND WAREHOUSES
ACROSS THE NATION

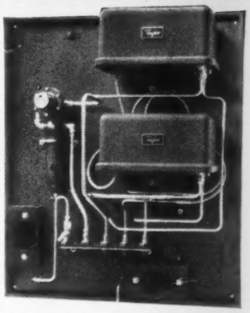
CARPENTER and PATERSON, Inc.

18 HURLEY ST., CAMBRIDGE, MASS.

±1% HUMIDITY CONTROL

For Heating, Piping and Air Conditioning





Now your laboratory or test room can have humidity control on the basis of *percentage of relative humidity*—instead of on the individual performance of wet and dry bulbs. Taylor's Wet-and-Dry Bulb Temperature Controller (above) can maintain ±1% relative humidity. That means you have standard conditions for physical testing of products. This amazingly close humidity control is achieved by the Taylor FULSCOPE*Recording Wet-and-Dry Bulb Controller using as measuring systems two Taylor TRANSAIRE*Temperature Transmitters with SPEED-ACT*compensation for lags in heat transfer (see picture at left).

If your production requires close humidity control, it will pay you to look into Taylor Automatic Control with TRANSAIRE Transmitters. Ask your Taylor Field Engineer or write for **Bulletin 98140.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Trade-Mark

Taylor Instruments
MEAN ACCURACY FIRST

WHO'S WHAT

Continued

▶ *FAIRBANKS CO.* — George P. Leckler, manager of new Chicago branch office and warehouse, to serve Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Colorado, Nebraska, Wisconsin. Frank Hockett Co., sales representative for New Mexico.

▶ *OLIN MATHIESON CHEMICAL CORP.* — Robert W. Pierce, manager of New England sales office in Lexington, Mass., to serve Massachusetts, Rhode Island, Maine, New Hampshire, Vermont.

▶ *TURNER BRASS WORKS*—J. A. Kane Assoc., representative for Virginia, Georgia, Florida, North and South Carolina areas.

▶ *TRION, INC.* — Representatives are Air Filter Sales & Service Co. for Jackson, Miss., area; Devlin Bros. for New Orleans territory.

▶ *CENTURY ENGINEERING CORP.* — Leo Graham, district sales manager for sections of New York, New Jersey, Pennsylvania.

▶ *BOHN ALUMINUM & BRASS CORP.* — Stanley B. Knapp Co., representative for southern area including Tennessee, Mississippi, Alabama, Georgia, Florida, North and South Carolina.

▶ *FAIRBANKS, MORSE & CO.* — W. F. Wahlenmaier, Milo C. Roy, and W. B. Morse, managers of the New Orleans, Portland, Chicago branches, respectively.

▶ *AMERICAN BLOWER* — Edward E. Howard, branch manager of new sales office in Albuquerque, N. M.

▶ *BABCOCK & WILCOX CO., TUBULAR PRODUCTS DIV.* — New York division office moved to Romax Bldg., Syracuse; Boston office relocated in Wellesley, Mass.

▶ *NIAGARA MACHINE & TOOL WORKS*—Smith-Courtney Co., representative for Virginia, North Carolina areas.

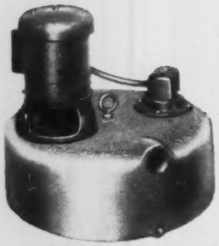
▶ *MINNEAPOLIS-HONEYWELL REGULATOR CO.* — J. T. Teed, director of eastern division; T. W. Tracy, director of western division.

Low Return *Condensate Pumps*

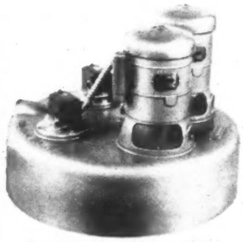
Capacities 500 to 15,000 sq. ft. E.D.R.

weil TVC PUMP

LOW RETURN CONNECTION
LOW SPEED, LONG LIFE
CAST IRON RECEIVER
LOW WATER LINE
FLOAT SWITCH CONTROL



SINGLE UNIT—Fig. 302A
10 Gal. Receiver for Single Units
Diameter 21″
Hgt. of Return above floor 6⅞″



DUPLEX UNIT—Fig. 303B
15 Gal. Receiver for Single or Duplex Units
Diameter 25½″
Hgt. of Return above floor 7$\frac{3}{16}$″

Unit Number	Max. Sq. Ft. Direct Radiation	Disch. Press. In Lbs. At Pump	GPM Radiation Will Condense	Capacity of Pump in GPM	Motor H.P.	Return Inlet in Inches	Pump Discharge in Inches	Diameter and Capacity of Receiver	Height of Return to Centerline
TVC-19	750	20	.38	1.5	¼	2	1	21″ -10 Gal.	6⅞″
TVC-23	1000	20	.5	1.5	¼	2	1	21″ -10 Gal.	6⅞″
TVC-29	2000	20	1.0	3.0	¼	2	1	21″ -10 Gal.	6⅞″
TVC-35	4000	20	2.0	6.0	¼	2	1	21″ -10 Gal.	6⅞″
TVC-41	6000	20	3.0	9.0	⅓	2	1	21″ -10 Gal.	6⅞″
TVC-47	8000	20	4.0	12.0	½	2	1	25½″-15 Gal.	7$\frac{3}{16}$″
TVC-52	10000	20	5.0	15.0	¾	2	1	25½″-15 Gal.	7$\frac{3}{16}$″
TVC-54	15000	10	7.5	22.5	½	3	1¼	25½″-26 Gal.	10½″
TVC-55	15000	20	7.5	22.5	¾	3	1¼	25½″-26 Gal.	10½″
TVC-56	15000	30	7.5	22.5	1	3	1¼	25½″-26 Gal.	10½″
TVC-57	15000	40	7.5	22.5	1½	3	1¼	25½″-26 Gal.	10½″

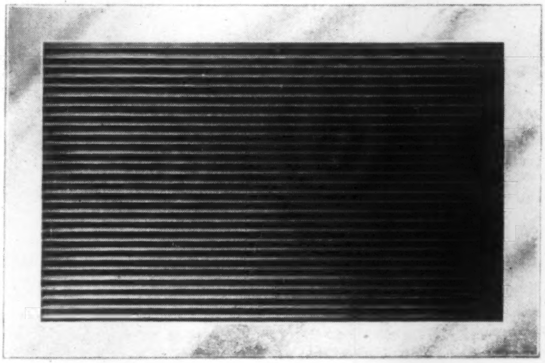
Intermediate Sizes Based Upon Discharge Pressure Required Are Available.

See Bulletin TVC-300-C for Full Specifications

See Catalog in 1957 Sweet's and 1957 Domestic Engineering Catalog Directory

weil PUMP COMPANY • 1514 N. Fremont St. • Chicago 22, Illinois

ALL NEW!
ALL ALUMINUM!
ALL EXCLUSIVE!



New A-J All-Aluminum No-Vision Grille

Another first in the field for A-J! This new extruded all-aluminum no-vision grille is the first of its kind . . . a grille that offers exclusive quality features never before available!

Imagine the beauty of this all-aluminum construction. Picture how its striking, modern look blends so perfectly with contemporary interior designs. Think of the ease of upkeep — corrosion and rust can never detract from its lifetime beauty. Because of the lightweight characteristics of aluminum, this new A-J Grille provides maximum free area (approximately 70%) with minimum weight.

The entire unit reflects quality in every detail of its construction. The perfectly mitered corners are securely fastened and locked mechanically. By utilizing an auxiliary frame the grille span can be adjusted for 1¼" to 2⅛" in depth.

CHOICE OF FINISHES

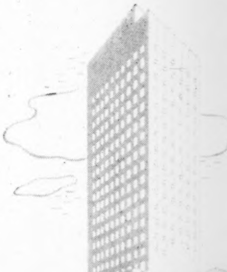
Standard mill finish is provided unless otherwise specified. Anodized or polished finishes are available. If non-standard finishes are desired, please consult the factory for prices.

This new A-J Grille is produced in standard sizes. For more information write A-J Manufacturing Company, Dept. H-11, 3601 E. 18th St., Kansas City 27, Mo.

FREE CATALOG
listing, describing and pricing 1,000 types and sizes of grilles, registers, etc.

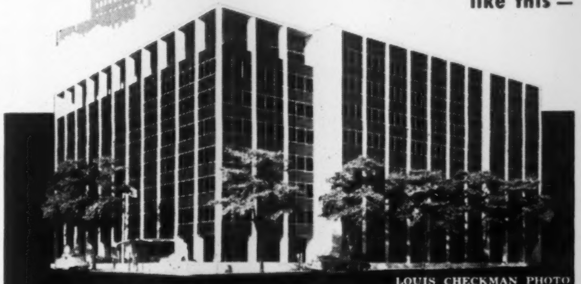
A-J

A-J Manufacturing Co.
Dept. H-11 3601 E. 18th St., Kansas City 27, Mo.



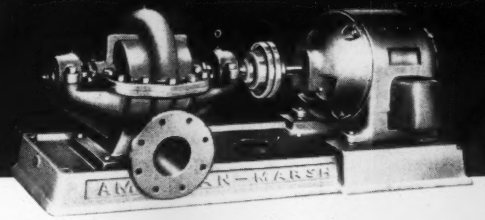
Handle HIGH STATIC HEADS with greatest EFFICIENCY!

— in skyscrapers or buildings like this —



LOUIS CHECKMAN PHOTO

with American-Marsh
TYPE HLM-HIM
Split-case Centrifugal Pumps



To insure years of efficient pumping service in the beautiful, modern NEA Educational Center, Washington architects *Joseph H. Saunders, A.I.A.*, selected *four* Type HLM-HIM American-Marsh Pumps.

In skyscrapers too, they're often installed because they're *properly designed and built* to handle *extremely high static heads.*

Such quality features as purge-type grease lubrication, heavy-section casings and extra-deep stuffing boxes recommend them to you. But get *all* the details . . .

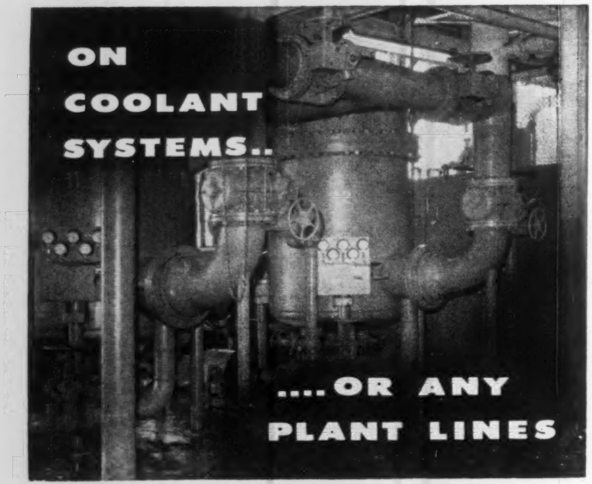
WRITE for new HLM-HIM Bulletin 350 with cutaway views and performance data!

Pumps and Pumps only Since 1873

AMERICAN-MARSH PUMPS
BATTLE CREEK MICHIGAN

In Canada:
American-Marsh Pumps (Canada) Ltd., Stratford, Ont.

CENTRIFUGAL, TURBINE, STEAM AND POWER PUMPS FOR TESTING, PROCESSING, BOILER FEED, FIRE PROTECTION, ETC



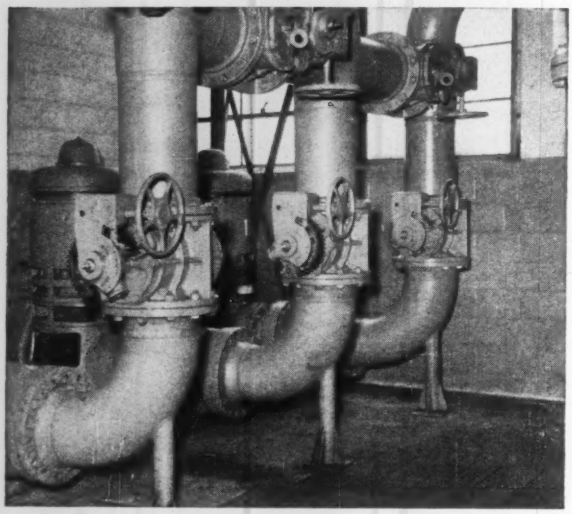
DeZurik Plug Valves
SHUT TIGHT...OPEN EASILY...
AND NEED NO LUBRICATION!

At the new Mound Road engine plant of Chrysler Corporation's Engine Division, DeZurik Valves are a part of the completely automatic centralized coolant system serving the "wet" machining and finishing operation.

Plant engineers are turning to DeZurik Valves to deliver outstanding performance on so many services. DeZurik's *exclusive* Eccentric Action *guarantees* dead-tight shut-off and easy operation *without lubrication!*

When you specify new or replacement valves in *your* plant, investigate DeZurik Valves, manufactured in a full range of metals and models from ½" thru 20". Representatives in all principal cities, or write to

DeZURIK
CORPORATION
SARTELL, MINNESOTA



WHO'S WHAT

Continued

▶ *YORK CORP.* — York Distributors, Inc., wholesale distributor in metropolitan New York area.

▶ *HALSTEAD & MITCHELL* — W. B. Knox, sales representative for Georgia, Alabama, South Carolina, Tennessee.

▶ *KEASBEY & MATTISON CO.* — James R. Reichel, San Francisco district manager.

▶ *DUNHAM-BUSH, INC.* — Ray Ferron, sales engineer, for southern Florida, Caribbean Island territory.

▶ *FEDERAL BOILER CO.* — William P. Klein, sales engineer for northern New Jersey, Staten Island areas.

▶ *EMBASSY STEEL PRODUCTS, INC.* — Highland Plumbing & Heating Supply Co., distributor for Baltimore area.

▶ *BURNHAM CORP.* — Phillip Barrett, branch manager for metropolitan New York.

▶ *CLARK CONTROLLER CO.* — Sidney W. Nelson, sales representative at Cincinnati district office.

▶ *JOHNS-MANVILLE* — Parker-Fallis Insulation Co., Inc., representative for north central, south central portions of Texas.

▶ *JOHNSON SERVICE CO.* — New quarters opened in East Syracuse, N. Y.

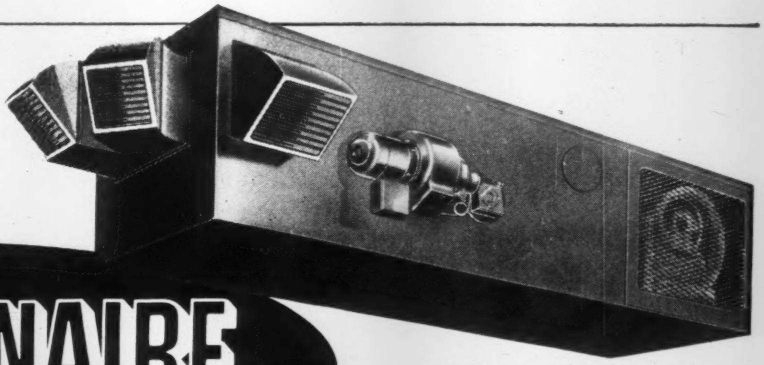
▶ *AIR REDUCTION SALES CO.* — H. C. Wallace, regional sales manager in southern region; A. W. Gilpin, assistant to Mr. Wallace; R. Pringle, assistant sales manager. All are headquartered in Houston.

▶ *ATLANTIC TUBE & METALS, INC.* — Bundy Tubing Co., representative for New York state, New Jersey territory.

▶ *RECOLD CORP.* — Don Bachman Co., representative for Denver area.

▶ *GEORGE L. SIMONDS CO.* — Robert Bruce, district manager of new Jacksonville branch office and warehouse. ✣

DOMINANT
*name in overhead
heating is still . . .*



SHAFCONAIRE®
THE ORIGINAL SUSPENDED FURNACE

Gas or oil-fired units designed especially for commercial and industrial installations

- ▶ **Backed by 18 years of specialized overhead heating experience!**
- ▶ **Engineered for more efficient, more economical operation!**
- ▶ **Producing exclusively suspended type heating equipment!**

**Models available for Gas or Oil
from 95,000 to 405,000 B.T.U. output**

Write or call for complete information today!

Up in the Air
and out of
the Way!
SHAFCONAIRE
OVERHEAD HEATERS

OverHead Heaters, Inc.
1612 BOOK BUILDING • DETROIT 26, MICHIGAN • WOodward 2-4647
Factory Location: Kalamazoo, Michigan

NEW! from **Marsh** OF DUNKIRK

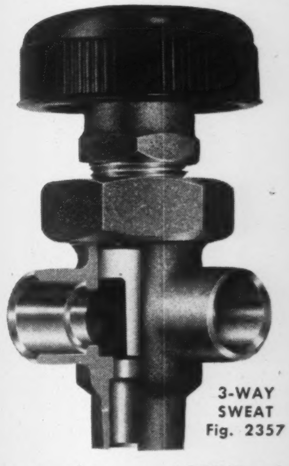
Gland-Packed

3-WAY VALVE

for
- air conditioning
- fin radiation
- diversion in heating systems

Here's another first from Marsh of Dunkirk where constant research and development are producing new products that help speed modern advances in our industry.

This totally new, gland-packed 3-way valve features a special Marsh-cast, precision machined sleeve closure which permits full shut-off of either outlet . . . or modulation of both. Designed for pressures up to 125 pounds, the new Marsh Fig. 2357 offers a non-rising stem, union bonnet and finger-grip Bakelite handwheel. It is available in ½" size with stem extensions to suit your individual requirements.



3-WAY
SWEAT
Fig. 2357

For complete, new 1958 Catalog featuring the new Marsh Fig. 2357 and the rest of the dependable, competitively priced Marsh line, write Dept. H11.

Marsh Valve CO. DUNKIRK, NEW YORK *Quality Valves Since 1910*

WE HEAR THAT . . .

▶ *DR. ALLEN D. BRANDT*, chief industrial hygiene engineer, *BETHLEHEM STEEL CO.*, was second place winner of the *ASSOCIATION OF IRON AND STEEL ENGINEERS* Kelly award for the best 1956 papers. His paper was entitled *Are You Getting Good Returns From Your Ventilating Investment?*

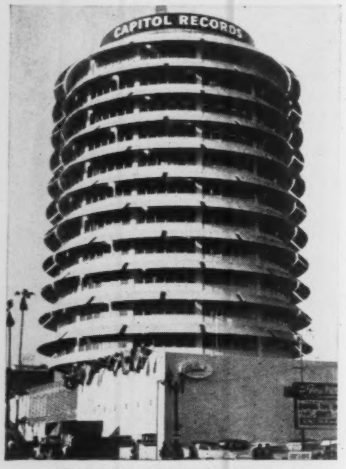
▶ *JOSEPH M. AIKMAN*, who has had 40 years of experience in the heating, air conditioning and ventilation field, announces his entry next month into air conditioning sales engineering in the St. Petersburg-Tampa area. His address will be 3063 Terrace View Ln., Kapok Terrace, Clearwater, Fla. He has been with A. W. Kerr & Assoc., Chicago, consulting engineers.

▶ *TUBE TURNS DIV. OF NATIONAL CYLINDER GAS CO.* will increase its manufacturing area approximately 40 percent by converting buildings on a 13 acre site adjacent to its main plant. A $400,000 construction contract has been signed to connect three existing buildings, creating a new manufacturing area under one roof.

▶ *WEIRTON STEEL CO., DIV. OF NATIONAL STEEL CORP.* recently placed into operation a new continuous cleaning and annealing line and a new coil galvanizing line in the sheet mill department. The new continuous galvanizing line is designed to operate at 300 fpm and will produce galvanized steel in widths from 18 to 48 in. New buildings were constructed for these facilities at Weirton, W. Va.

▶ Ground has been broken by *WALWORTH CO.* for the construction of a $5-million brass valve plant and a research and engineering center in Braintree, Mass. The two new buildings, on an 85 acre tract, are scheduled for completion during fall of next year. Total floor area will be 300,000 sq ft with approximately 227,000 sq ft for production and plant facilities.

▶ *BELL & GOSSETT CO.* has acquired a controlling interest in three Marble corporations including *MARBLE ARMS CORP.*, *MARBLE-CARD ELECTRIC CORP.*, and *MARBLE REALTY CORP.* Serving as new directors for the Marble organizations are C. E. Pullum, chairman of the board and chief executive officer; R. E. Moore, H. A. Lockhart, A. T. Woerthwein, John Greene, John Zerbel, and W. M. Marble.



CAPITOL RECORDS BLDG.
LOS ANGELES, CAL.

WELTON, BECKET & ASSOCIATES, ARCHITECTS-ENGINEERS, STATE PLUMBING & HEATING CO., MECHANICAL CONTRACTOR

Capitalize on

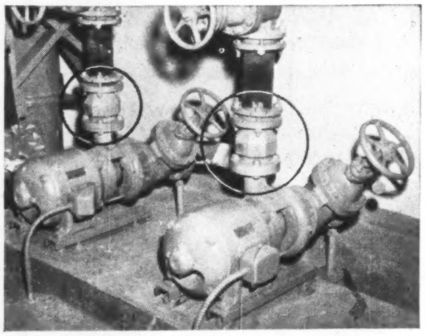
MILLER Streamflow CHECK VALVES

Completely Silences your piping system! CENTER-GUIDED, SHOCK PROOF, NOISELESS, ELIMINATES WATER HAMMER. FULL RADIAL FLOW.

SIZES 1" THROUGH 24".

FLANGED, ASA DRILLING, IBBM, CAST STEEL, ALL ALLOYS. FOR ALL FLUIDS AND GASES.

CERTIFIED MINIMUM PRESSURE DROP CURVE AVAILABLE



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Extra-Profits
in your
pocket
with

"engineer-
approved"

ELGEN *All-Tite* VANE RUNNERS
NOW IN COILS!

OPEN THIS END
PULL HERE THIS END UP USE NO HOOKS
Save Time and Money ... with ELGEN All-Tite VANE RUNNERS

THE EASIEST AND QUICKEST WAY EVER DEVISED
for installing single or double blade turning vanes in square elbows. No special tools required.

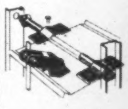
New production machinery of our own exclusive design, now enables us to produce button type Elgen All-Tite vane runners in continuous coils, effecting a savings in *your cost per job*.

COILED ELGEN ALL-TITE VANE RUNNERS MEANS . . .

- *Less Waste!* Waste pieces due to short ends are a thing of the past. Vane runner metal is coiled in 100 foot lengths, you just pull out the exact footage needed.
- *Easier Storage!* Each coil weighs approximately 50 lbs. and is packed in a box 28" x 28" x 5". Box fits easily under bench or against wall.
- *Easier Handling!* No loose pieces lying around to get in the way or collect dirt.
- *Unrolls absolutely flat!* Vane runner metal emerges from the box at bench height . . . absolutely flat . . . ready for use.

TWO MORE ENGINEER-APPROVED ELGEN PRODUCTS THAT SAVE YOU TIME AND MONEY

ELGEN SILENT DUCT
. . . for forming "flexible" duct connectors. A one piece metal to material unit, packed in coils, unrolls absolutely flat. Makes on the spot work a cinch.



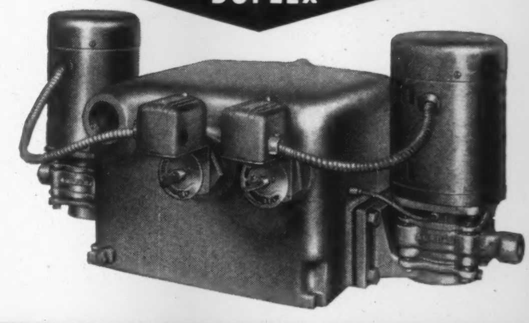
ELGEN DAMPERSET
. . . for multi-blade dampers, parallel or opposed. Most perfect damper hardware developed.

ELGEN PRODUCTS ARE SOLD THROUGH LEADING JOBBERS EVERYWHERE.

Write today for free catalog and "spec" sheet!

ELGEN MANUFACTURING CORP.
41-34 39th Street, Long Island City 4, N. Y.

"Install Piping and Line Leads — PUMP is READY TO GO"
SIMPLEX
and
DUPLEX



AURORA® *Packaged* COND-A-PAC
CONDENSATION RETURN UNITS

The advanced COND-A-PAC is a packaged unit, ready to hook to piping and line leads. It is NEW — with LOW NPSH characteristics — compact, efficient and quiet — very low return — self venting to prevent vapor lock — designed for best performance on hot water service — and is ideal for AIR CONDITIONING duty.

TWO SIZES
•
20 PSI DISCHARGE PRESSURE
•
3,500 RPM

A 500-4,000 EDR unit capacity 8 GPM with receiver capacity 6 gallons (Simplex), 12 gallons (Duplex), 1/6 HP.

B 6,000-8,000 EDR unit capacity 15 GPM with receiver capacity 12 gallons (Simplex and Duplex), 1/4 HP.

TOP PERFORMANCE ASSURED by MANY VALUE FEATURES

COMPACTNESS • HIGH EFFICIENCY • LONG, TROUBLE-FREE LIFE • LOW RETURN • MECHANICAL SEALS or PACKING • SELF LUBRICATING • STAINLESS STEEL MOTOR SHAFT • HEAVY DUTY FLOAT SWITCH • TAPPED OPENINGS • THREE POSITION DISCHARGE • BRONZE GLANDS • CONVENIENCE • NEMA MOTOR • AMPLE FLOAT CAPACITY • EXTRA WATER CAPACITY • VACUUM SERVICE • AIR CONDITIONING

FOR DETAILS ASK FOR BULLETIN 114 PKG

OTHER AURORA RETURN UNITS

Aurora Condensation Return Units are of a variety to fully meet practically every situation in automatic return to low and high pressure boilers of the hot water condensation from radiators, coils, etc. — or return of water and other liquids to the overhead tanks of gravity circulating systems in industry. WHATEVER YOUR RETURN PROBLEM, AURORA CAN HANDLE IT.

AURORA PUMPS SERVE EVERY NEED IN INDUSTRY WRITE for CONDENSED CATALOG "M-52"

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AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
80 LOUCKS STREET • AURORA • ILLINOIS
EXPORT DEPARTMENT — Aurora, Illinois — Cable Address "NYABINT"

WE HEAR THAT

Continued

▶ *SQUARE D CO.* has constructed a $500,000 and 31,000 sq ft electrical equipment assembly plant in Atlanta. Switchboards, circuit breakers, control centers, and related devices will be manufactured at the new plant.

▶ A new manufacturing plant is now being operated by *SWIFT & CO.* in Hammond, Ind. The plant is manufacturing a diversified line of solvent adhesives, primers, coatings, and sealants for all phases of the industrial market.

▶ Manufacturers of almost all room air conditioners made in the United States will again publish capacity ratings of their products in terms of Btu per hr, according to the *AIR-CONDITIONING AND REFRIGERATION INSTITUTE.* The program was adopted last year in a move to give purchasers of room units a yardstick by which to judge performance of the equipment, the institute says.

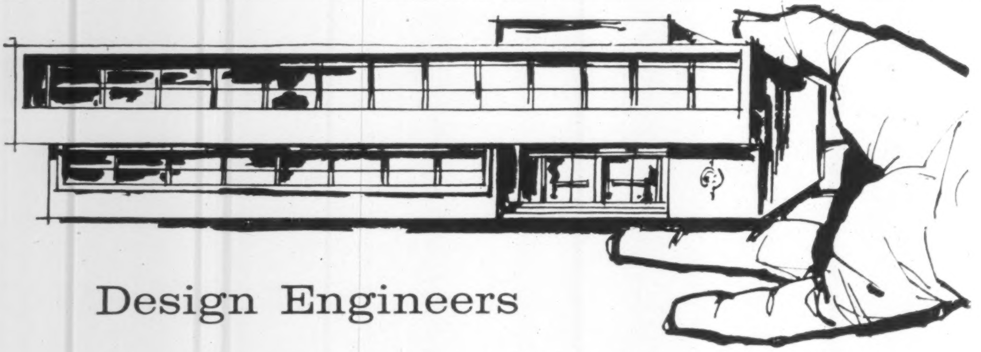
▶ A completely integrated tube fitting and tubing tool manufacturing building has been placed into operation at Niles, Ill., by *IMPERIAL BRASS MFG. CO.* The new structure will house all of the company's manufacturing facilities, executive and sales offices.

▶ Throughout the 10th Exposition of the Air-Conditioning and Refrigeration Industry in Chicago this month, *MARSH INSTRUMENT CO.* will provide free bus service between major loop hotels and the International Amphitheater. Buses will operate daily at fifteen minute intervals during show hours. Buses will make regular stops at the Sherman, Morrison, Palmer House, and Conrad Hilton hotels.

▶ *HYDROTHERM, INC.* is expanding its manufacturing plant and other facilities in Northvale, N. J. A new building will provide space for sales and engineering personnel and will house a laboratory.

▶ A new seamless pipe mill at the Indiana Harbor Works of *YOUNGSTOWN SHEET AND TUBE CO.* is now operating. Earlier this year, a new electrolytic tinning line went into production.

▶ Stockholders of *SERVEL, INC.* have approved the sale of the company's all-year air conditioning division to the *ARKANSAS LOUISIANA GAS CO.* of Shreveport, La. Included in the sale were the entire business, property and assets of the division and also the defense division, aggregating 14 acres of land and several buildings with a total of 478,000 sq ft of floor space. All are located in Evansville, Ind., and total sale price was approximately $4 million.



Design Engineers

Argonne National Laboratory is interested in interviewing engineers who have a minimum of 5 to 15 years professional level design experience in these fields:

- PLANT LAYOUT AND BUILDING DESIGN
- HEATING AND PIPING
- VENTILATION AND AIR CONDITIONING
- ELECTRICAL LIGHTING AND POWER
- STRUCTURAL ENGINEERING

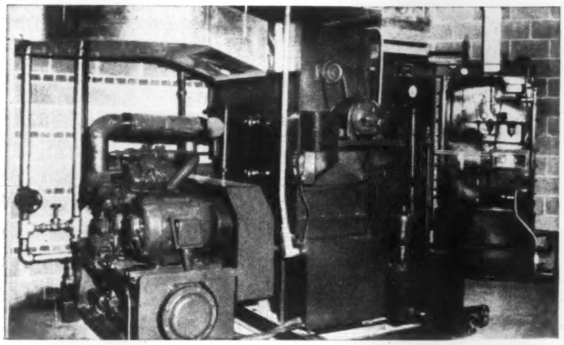
Inquiries are Invited:

Send resumé to
Professional Personnel Office
P.O. Box 299
Lemont, Illinois

Responsibilities will involve co-ordinating the requirements, design and construction of new buildings and facilities. Prerequisite: ability to provide liaison between the research staff, architect-engineer, and construction contractor.

Argonne
P. O. BOX 299 • LEMONT, ILLINOIS
NATIONAL LABORATORY
SUBURBAN CHICAGO AREA

DRY AIR...
PRECISELY as you want it



NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

AT THE
CHEMICAL SHOW
26th EXPOSITION OF CHEMICAL INDUSTRIES
Coliseum, New York City, December 2 – 6, 1957
See NIAGARA . . .
AIR CONDITIONERS • *Aero* HEAT EXCHANGERS
***Aero* AFTER COOLERS • *Aero* REFRIGERANT CONDENSERS • *Aero* STEAM CONDENSERS**
***Aero* VAPOR CONDENSERS • HUMIDIFIERS**
HEATERS • COOLERS • DRYERS
BOOTH No. 655

Write for full information; ask for Bulletins 112 and 121. Address Dept. HP-11

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N. Y.
District Engineers in Principal Cities of U.S. and Canada

NEW permanent dry-type

A-lum-O-Aire Copper

FILTERS...

designed for industrial air-cleaning requirements

RESISTS RUST and CORROSION

Impervious to hazardous industrial atmospheres, new A-LUM-O-AIRE COPPER Filters are the practical solution for handling corrosion and moisture-laden fumes, vapors and gases. Copper wool, used as the filter media, is manufactured by Carey to precision standards from special alloys developed expressly for air cleaning. Mat retainers are copper plated for longer life with added protection against rusting and corrosion.

QUICKLY CLEANED for CONTINUOUS USE

Simply flush A-LUM-O-AIRE COPPER Filters with water or solvent and replace. No hazardous oils to add; no messy adhesives required. END pyramiding filter replacement costs NOW with the filter designed for the rugged demands of industry. Available in standard and high-velocity types for normal resistance or engineered to your specific size and capacity requirements.

America's *first* practical recleanable all-metal, dry-type air filter! Approved by Underwriters (Class 1)!

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about your new A-LUM-O-AIRE Filters and show me how we can save money on our air-cleaning activities.

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Company__________
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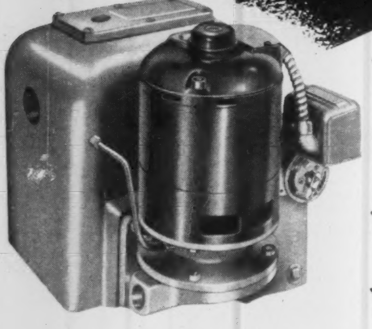
IT'S NEW! IT'S TOPS!
it's the Sterlco® 4223-E
LOW PRESSURE
CONDENSATE PUMP



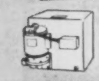
☆ SURPRISING VERSATILITY
☆ UNUSUAL CAPACITY
☆ TREMENDOUS PERFORMANCE
☆ ECONOMICAL PRICE

- **DESIGNED SPECIFICALLY FOR SMALL INSTALLATIONS . . .** yet adequate for jobs up to 3000 sq. ft. EDR.
- **ALLOWS ACCURATE ADJUSTMENT . . .** Float switch travel can be adjusted for a draw of from .7 to 3 gals. per pumping cycle for close adjustment to boiler requirements.
- **SMALLER IN SIZE, YET BIGGER IN USABLE VOLUME . . .** a truly believe-it-or-not design. Although the 5 gal. cast iron tank is one of the smallest, it has greater "draw" or usable volume than many pumps with larger tanks.
- **LOTS OF EXTRA CAPACITY FOR EMERGENCIES . . .** Equipped with the same pump and motor used for the larger capacity ¼ h.p. Sterlco pumps.
- **TAKES LESS SPACE THAN ANY OTHER . . .** Occupies only 1.6 sq. ft. of floor space. Fits easily into almost any small corner because of rectangular shape and convenient location of motor and switch at front of unit.
- **EXCEPTIONALLY QUIET, RUGGED, DEPENDABLE . . .** Includes the same high quality features found in Sterlco's heavy duty pumps.

USE THE RIGHT PUMP FOR THE JOB!
The addition of the No. 4223-E makes the Sterlco 4100-4200 Series Condensation Pumps one of the most complete lines of low pressure pumps on the market.

Write now for complete information.
Sterlco Products Distributed Through Leading Heating and Plumbing Wholesalers. Representatives in all principal cities.

STERLING, INC.
3732 N. Holton St., Milwaukee 12, Wisconsin


CONDENSATION AND VACUUM PUMPS

HEATING SPECIALTIES

TEMPERATURE CONTROLS

WE HEAR THAT

Continued

▶ More than 50,000 sq ft of manufacturing space and a new gas meter laboratory have been added to the DuBois, Pa., gas meter plant of *ROCKWELL MFG. CO.* Approximately 27,000 sq ft, including new engineering facilities, have been added to the firm's Uniontown, Pa., water meter plant.

▶ *HAVEG INDUSTRIES, INC.* has acquired the *REINHOLD ENGINEERING AND PLASTICS CO., INC.* of Norwalk, Calif. It is now a wholly owned subsidiary of the firm. Services on the west coast will be extended and product lines will be broadened as a result of the acquisition, according to company officials.

▶ *AIR REDUCTION SALES CO.* has acquired *ADELSON-WERTS, INC.* of Hartford, Conn. The Hartford firm has been an authorized dealer for the company since 1948, serving industries in the central and northwest areas of Connecticut.

▶ The fan division of *DRYER ELECTRIC CORP.* is now located in Brooklyn.

▶ Houston district headquarters for the machinery and systems division of *CARRIER CORP.* are located in a new office building four miles from the downtown business district.

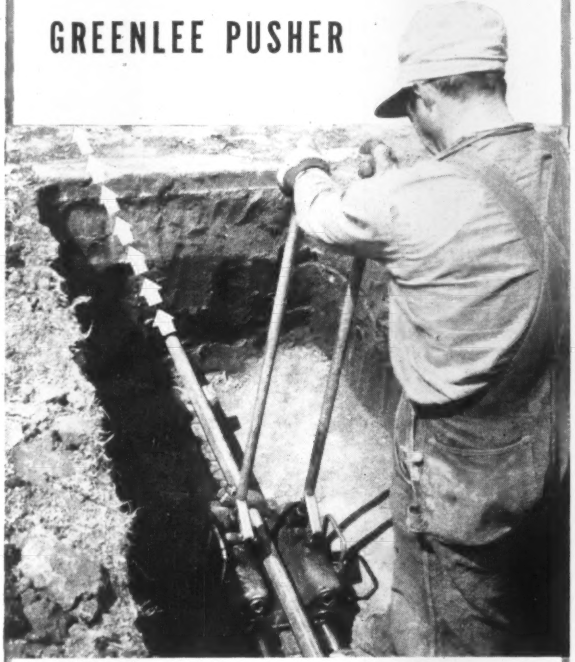
▶ *BLACK MFG. CO.* has opened a new warehouse in Kansas City. Thomas Neilson is serving as manager.

Obituary

Theodore E. Mueller

THEODORE E. MUELLER, 72, former chairman of the board of American Radiator & Standard Sanitary Corp., died September 24 in Louisville, Ky., following a long illness. As a very prominent figure in the heating industry, Mr. Mueller served as president of the firm from 1935 until 1946 at which time he was elected board chairman. He was named director emeritus in 1955 when he retired from the board. Mr. Mueller began his career in 1904 as an apprentice pattern maker in the Standard Sanitary Mfg. Co.'s Pittsburgh plant. He was elected vice president, general manager of manufacturing of the American Radiator & Standard Sanitary Corp. in 1939, after serving as director and member of the executive committee since 1935. He was a member of the Engineers Club in New York City. +

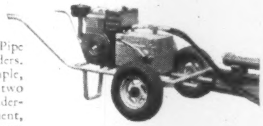
CUT COSTS ON UNDERGROUND PIPING INSTALLATIONS WITH GREENLEE PUSHER



Save hours of time, cut job costs with this quick, easy way of installing underground pipe. With a GREENLEE Hydraulic Pipe Pusher, *one man* pushes pipe *under* streets, walks, tracks, lawns, floors, and other obstacles. No costly tearing up of paving . . . eliminates extensive ditching, as just a short trench accommodates the Pusher. No tedious tunneling, backfilling, tamping, repaving. Compact, portable, powerful. Often pays for itself on first few jobs. Thousands in use for big savings of time and labor. Two models: one for ¾ to 4″ pipe, one for larger pipe, concrete sewer pipe, drainage ducts. Write for facts today.

POWER PUMP

For all models of GREENLEE Pipe Pushers and Hydraulic Pipe Benders. Makes the toughest pushing jobs simple, fast. Average pushing performance: two feet per minute. Rubber-wheeled undercarriage, available as extra equipment, provides convenient, easy way to transport and move about on job location.

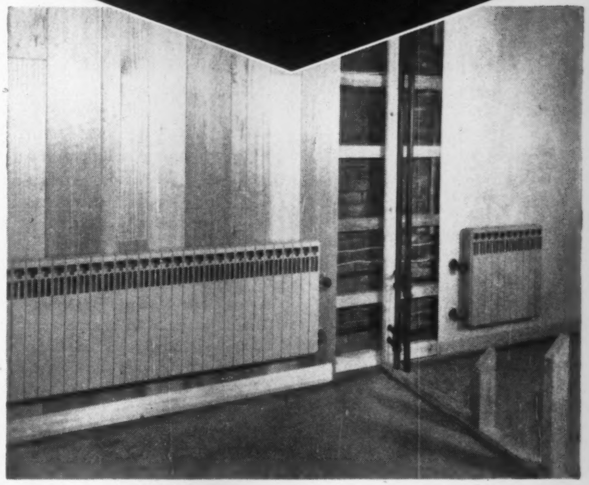


TOOLS FOR CRAFTSMEN

GREENLEE

Greenlee timesaving tools for plumbing and heating work: Hydraulic Pipe Pushers • Hydraulic Pipe Benders • Tubing Benders • Pipe Bits Auger Bits • Spiral Screw Drivers • Chisels • And many more
Greenlee Tool Co., 2351 Twelfth Street, Rockford, Illinois

REDUCE piping costs . . . SPEED installation

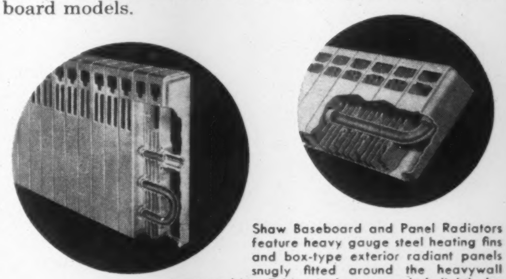


with SHAW Radiators

Only Shaw, of all modern radiators, offers *same end* as well as opposite end tapping. Same end tapping has a place in almost every piping layout, and its use invariably means less piping materials, simplified pipe fitting.

Important savings in installation time are made with *any* Shaw model, regardless of tapping arrangement. Shaw units are compact, fully self-contained assemblies only 3″ thick, easy to handle and mount. There are no dampers, or separate housings to fit and install.

Shaw Radiators distribute both radiant and convected heat in unvarying, health-guarding proportions that create natural thermal comfort in a room. They use either hot water or steam up to 150 psi. Write today for free literature on both panel and baseboard models.



Shaw Baseboard and Panel Radiators feature heavy gauge steel heating fins and box-type exterior radiant panels snugly fitted around the heavywall copper tubing. Tubing is then expanded slightly by 3750# hydraulic pressure to hold all components as a rigid, self-contained unit. The tight metal-to-metal bond assures rigidity and full heat conduction.

SHAW-PERKINS
MANUFACTURING COMPANY
201 East Carson St. • Pittsburgh 19, Pa.

SMALL STEAM TRAP

. . . but large capacity!

New Design
New Operating Principle

Small as a tee fitting! That's the Sarco TD . . . all sizes ⅜ to 1"!

But don't let the small size fool you! ½" Sarco TD, for example, has capacity of 1280 lbs/hr, 150 psi, saturated steam temperature.

Capacity is determined, *not* by a bulky body, but by the effective orifice, valve action, pressure drop, and condensate temperature.

Few of many advantages

Same trap and large capacity seat for all pressures, 10 to 600 psi . . . light or heavy loads. Self-adjusting. Has no valve mechanism. Only one moving part.

Ask for 60-day trial trap and strainer. No cost or obligation. Buy *only* if satisfied. Specify size, use. Sarco Co., Inc., 635 Madison Ave., N. Y. 22, N. Y. 2228-F

SARCO Thermo-Dynamic STEAM TRAP
TRADE MARK

THE MODERN TRAP THAT IS MAKING STEAM TRAPPING HISTORY!

WE HEAR THAT

Continued

▶ Offices of the *MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA, INC.* and *NATIONAL CERTIFIED PIPE WELDING BUREAU* are now located at 45 Rockefeller Plaza, N. Y.

▶ *METALS & CONTROLS CORP.* has expanded thermostat manufacturing facilities at its products division in Versailles, Ky.

▶ *ROBERTSHAW-FULTON CONTROLS CO.* has changed the name of its *FIELDEN INSTRUMENT DIV.* in Philadelphia to the *INSTRUMENT DIV.*

▶ *PENN CONTROLS, INC.* has been awarded a citation by the *NATIONAL SAFETY COUNCIL* for establishing a safety record of 2 million man hours worked without a lost time injury.

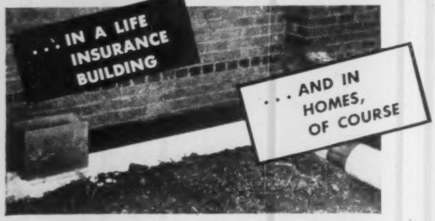
▶ For the fifth consecutive year, *NATIONAL-U.S. RADIATOR CORP.* has granted a college education in engineering to high school graduates selected by company executives. The firm awards scholarships to high school graduates residing in cities where the company has manufacturing plants. ‡

For in-slab warm air systems...

Transite* Air Duct
is specified for trouble-free service

. . . IN A RAILROAD STATION

. . . IN A HEALTH CENTER

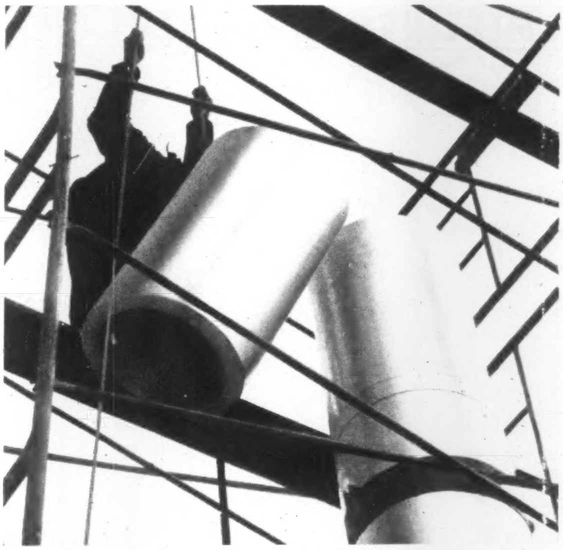

. . . IN A LIFE INSURANCE BUILDING
. . . AND IN HOMES, OF COURSE

Transite Air Duct is easily installed. Its joints are assembled quickly, simply. It never needs anchoring. It easily withstands rough handling and impact of poured concrete. Transite Air Duct resists corrosion. Made of asbestos-cement. Transite's corrosion resistance and long trouble-free life are a matter of record. And, it is priced for competitive bidding. Write today for further information: Address Johns-Manville, Box 14, New York 16, New York. (In Canada, Port Credit, Ontario.)

*Transite is a Johns-Manville registered trademark

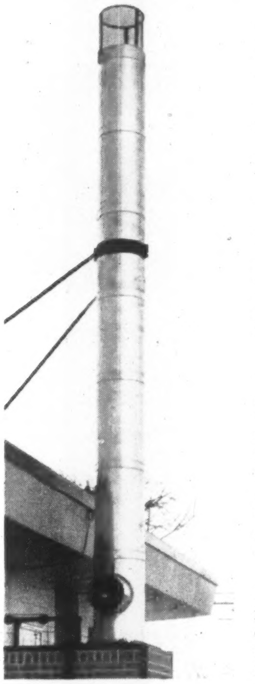
JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE AIR DUCT
an asbestos-cement product



3-ft. section of Van-Packer Stack is hoisted into place. Sections are cemented together and secured with joint bands.

Prefabricated refractory stack for industrial incinerators is durable and economical



Problem: Need for a low-cost, permanent stack for use with industrial incinerators. *Solution:* Specify prefabricated refractory Van-Packer Stack. The Van-Packer is economical, has masonry permanence, and its Hi-Temp Sections withstand temperatures up to 2000° F.

Centrifugally-cast of non-corroding refractory material, the Van-Packer Stack lasts substantially longer than steel, yet costs no more. It costs 2/3rds less than brick and ½ less than tile-lined concrete block. Stack sections are encased in aluminum to eliminate maintenance.

Because the insulated sections prevent excessive heat loss thru stack walls, the Van-Packer provides higher draft than a steel stack and about the same draft as a brick stack. Besides Hi-Temp Sections for incinerators, Van-Packer offers Standard Sections for furnaces and boilers. 7" diameters from 10" I.D. to 30" I.D. are available.

Available nationwide through Van-Packer heating and building material jobbers and manufacturers representatives. See "Chimneys — Prefabricated" in Yellow Pages, or write Van-Packer.

see our catalog in Sweet's

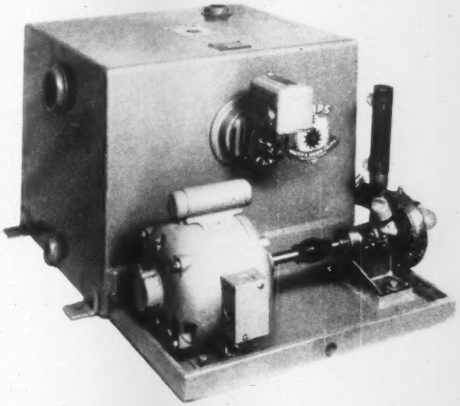
Send for 80-page data file with guying, installation method, test reports

FLINTKOTE **Van-Packer** PREFABRICATED REFRACTORY **Stack**

Van-Packer Company • Division of The Flintkote Company
P. O. Box No. 306 • Bettendorf, Iowa • Phone 5-2621

GET THE EAGAN EAGLE...

The Condensate Pump with the Big Advantages



The EAGAN EAGLE does not require a pit even though return lines may be only a foot above the floor. It handles steam heating loads up to 8000 sq. ft. at 20 psi.

The low cost EAGAN EAGLE handles far more capacity than any similar pump at the same price (to 8000 sq. ft. EDR at 20 psi.) In addition this high quality, quiet operating condensate pump:

- Meets the demand for a condensate pump with a low return inlet to eliminate the need for a costly pit
- Contains an all bronze EAGAN centrifugal pump with non-clogging, open impeller, stainless steel shaft, life sealed ball bearing
- Has a *standard* ¼ hp capacitor type motor, not a costly, special, close-coupled, hard-to-replace motor
- Has a flexible coupling and flexible connectors on both suction and discharge pipes to isolate the pump and prevent pipe cramp, misalignment, wear and noise
- Has a large capacity safety factor providing for at least 1 to 3 "on off" operation

Other models are available with capacities to 100,000 square feet at 200 psi, all with the outstanding features that make EAGAN condensate pumps so popular.

Write, wire or call us with your pumping problems and let us bid on your job.

WALTER H. EAGAN CO., INC.

Pump Specialists Since 1920
2336 Fairmount Ave., Philadelphia 30, Pa.
STevenson 7-2300

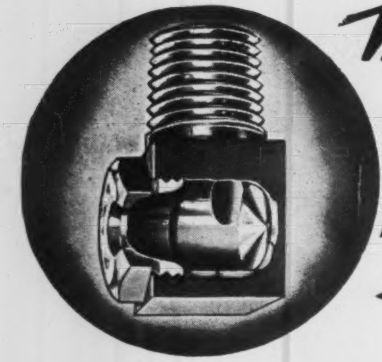
Send me information on the EAGAN pumps checked:

☐ Condensate ☐ Boiler Feed ☐ Centrifugal
☐ Turbine ☐ Fuel Oil Pump & Heater Sets

NAME ____________

ADDRESS ____________

CITY ____________ ZONE ________ STATE ________



Monarch

NOZZLES
for
AIR WASHERS

These are "non-clogging" nozzles with a single large tangential lead hole to the swirl chamber that will never clog from any impurities small enough to pass through the orifice. Swirl chamber is conical on both ends and pivots liquid like a top to produce an exceptionally fine, evenly distributed, balanced spray of about 80° included angle. Wider spray angles up to 130° can be furnished to order.
Standard material Brass. Also available in Stainless Steel and Monel. Pipe sizes from 1/8" to 1". 1/4" size is 1-5/16" long and made from 5/8" square stock.

Write for Catalog I

Monarch MFG. WORKS, INC.
2523 E. ONTARIO ST.
PHILADELPHIA 34, PA.

Canadian Agents: (Except B. C.)
E. S. Gallagher Sales Ltd., Toronto 12, Canada

MEETINGS & CONVENTIONS

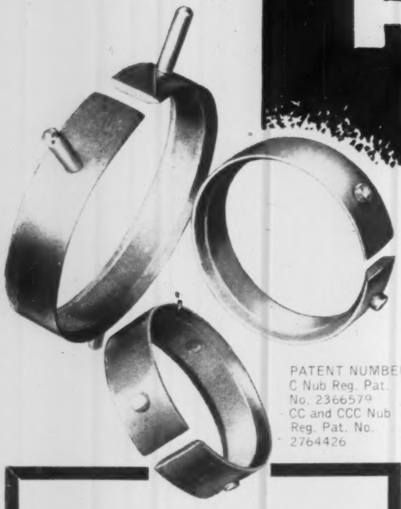
1957

NOV. 12-14—*National Association of Corrosion Engineers*, northeast regional meeting. Pittsburgh. NACE headquarters: 1061 M & M Bldg., Houston 2.

NOV. 13-14—*Air Pollution Conference.* Chicago. Cosponsored by Armour Research Foundation and Midwestern Air Pollution Prevention Association. Information: Conference secretary, Armour Research Foundation, 10 W. 35th St., Chicago 16.

NOV. 13-16—*National Association of Corrosion Engineers*, technical meeting and corrosion short course. Key Biscayne Hotel, Key Biscayne, Fla. Conducted by Miami section of NACE. NACE headquarters: 1061 M & M Bldg., Houston 2.

NOV. 14-16—*American Society of Refrigerating Engineers*, semi-annual meeting. Shoreland Hotel, Chicago. ASRE headquarters: 234 Fifth Ave., New York.



ROBVON
BACKING RINGS...

APPROVED BACKING RINGS FOR WELDING PIPE, VALVE, and FITTING JOINTS

1. **Immediate precise close tolerance fit up upon insertion.**
2. **Consistent root penetration and fusion.**
3. **Radiographic quality welds.**
4. **Ease of handling in both shop and field operations.**

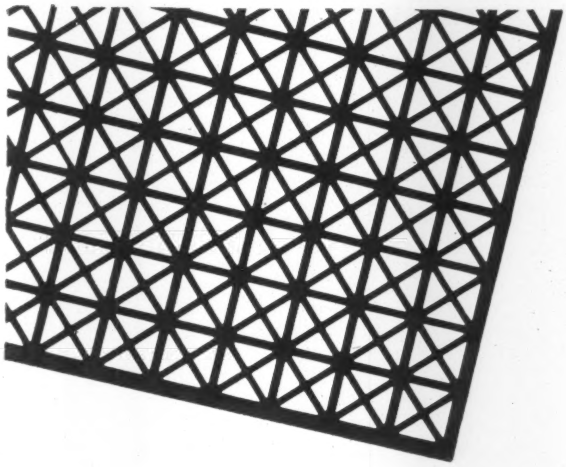
Available in Carbon Steel, Wrought Iron, Chrome Alloys, Stainless Steel, Aluminum and Copper.

PATENT NUMBERS
C Nub Reg. Pat.
No. 2366579
CC and CCC Nub
Reg. Pat. No.
2764426

Write for our latest literature Bulletin No. 56-2 and Folder No. 1

Robvon Also Manufactures Machined Rings to Customers Specifications

ROBVON BACKING RING COMPANY
675 Garden Street **Elizabeth, New Jersey, U.S.A.**



THEY'RE ELEGANT ...THEY'RE ECONOMICAL

Hendrick Architectural Grilles

When an architect draws up specifications for a new building or a modernization proposal he must adhere to two basic principles: FIRST, he must use his head in keeping costs down. SECOND, he must recommend functional materials and components that appeal to his client's decorative motif and sense of beauty.

That's why more and more architects specify Hendrick Grilles. Available in hundreds of attractive designs, Hendrick Grilles cost less to buy . . . cost less to install and cost less to maintain! And they provide more-than-ample area for free passage of air . . . always lie flat . . . don't bend or warp. For more information write to Hendrick, today.

SEE OUR CATALOG IN SWEET'S

HENDRICK

MANUFACTURING COMPANY

48 DUNDAFF STREET **CARBONDALE, PA.**

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles Mitco Open Steel Flooring — Shur-Site Treads • Armorgrids Hydro Dehazers • Petrochemical Column Internals

#625

All set to save on fuel bills

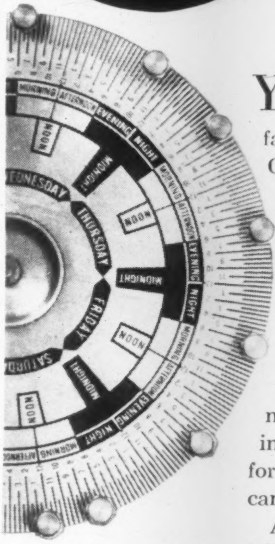
any day, any night, all week!

PARAGON 700 SERIES

7-DAY CALENDAR DIAL

TIME SWITCH

Turns heating equipment off when not needed



Dial is graduated into hours and half-hours. Fourteen dial trippers supplied. Available in 24, 120 and 240 volts; 25, 50 and 60 cycles. Lists as low as $29.50. Order from your jobber.

YOU can't beat the 700 series for promoting customer satisfaction through lower fuel bills! Once installed, it automatically turns heating systems ON as needed — turns them OFF during non-working-hours.

An entire week's program can be set in advance. ON-OFF can be programmed to any irregular daily schedule. Any day or days can be eliminated entirely. Monday morning ON can be earlier than usual for week-end pick up. Operations can be as close as 3 hours.

Air conditioning, ventilating, lighting, flushing, pumping and other operations can also be controlled on a weekly schedule with this 7-day time switch.

Write for information on the Paragon 2900 series to solve your off-schedule heating problems.

TODAY — Write for "Time is Money" — new Paragon handbook for you and your crews. Twenty pages of money-making ideas and handy application chart. Address Dept. 1811

Time is money
PARAGON

PARAGON ELECTRIC COMPANY

TWO RIVERS, WISCONSIN

you want 'em? we got 'em!

28 FULL LINES!

d-h AIR CONDITIONING

SPOTAIRE ROOM-by-ROOM AIR CONDITIONERS: **#1** d-h LRC's: basic unit, concealed or deluxe cabinet; 4 models, 200 thru 600 cfm. **#2** d-h VRC's: concealed or deluxe consoles; 3 models. 200 thru 600 cfm. **#3** d-h HRC's: 3 suspended types, 19 models, 300 thru 1750 cfm.

AIR HANDLING UNITS: **#4** d-h HH Series: ceiling suspended. **#5** d-h HHV Series: floor mounted. Both: 14 models, 624 thru 28000 cfm.

VENTILATING UNITS: **#6** d-h AM: 1752 thru 32250 cfm.

MULTIZONE TYPES: **#7** d-h FLEXAZONE: for simultaneous, independent, variable heating, cooling, ventilating; 1752 thru 32250 cfm.

PACKAGED AIR CONDITIONERS: **#8** d-h AECR: with built-in evaporative condenser. **#9** d-h SCR: with water-cooled condenser. Both, 7½ thru 75 H.P.

PACKAGED STORE COOLERS: **#10** d-h DYNA-PAC & ROYALAIRE: 2 thru 15 tons.

PACKAGED WATER CHILLERS: **#11** d-h CWG: 7½ thru 75 H.P. **#12** d-h CWG-E: attached evaporative condenser. Both 7½ thru 75 H.P.

EVAPORATIVE CONDENSERS: **#13** d-h PERMA-FAN: 13 models; 5 thru 110 tons.

COILS: **#14** Extended surface; steam, water, DX **#15** Type "H"; small applications, DX or chilled water.

PACKAGED WATER CHILLERS: **#16** d-h AC; air cooled. **#17** d-h WC: water cooled. Both, 2, 3, 5 H.P.

COOLING TOWERS: **#18** d-h WMT: 13 models, 5 thru 100 tons.

AIR-COOLED CONDENSERS: **#19** d-h ACC: 5 models, 2 thru 20 tons.

d-h COMMERCIAL REFRIGERATION:

UNIT COOLERS: **#20** d-h FLOCOLD UNIT COOLERS: over 34° F; 11 models; 750 thru 6000 cfm. **#21** d-h FLOCOLD: under 34°F, water defrost, 7 models, 750 thru 6000 cfm. **#22** d-h FLOCOLD: over and under 34° F; water defrost ammonia, 4 models, 2000 thru 6000 cfm. **#23** d-h SPASAVER; WALK-IN BOXES: over 34° F, 7 models, 730 thru 4400 cfm. **#24** d-h HOT SHOT; AUTOMATIC ELECTRIC DEFROST: under 34° F, 6 models, 700 thru 3700 cfm. **#25** d-h HRC; MEAT CUTTING & PACKAGING ROOM UNITS: 14 models, 500 thru 1750 cfm. **#26** d-h FLOCOLD HOT PAN; LIQUOR/MEAT WALK-IN: 8 models, 750 thru 6000 cfm.

PRODUCT COOLERS: **#27** d-h FLOCOLD (FT & CT; FTWD & CTWD; FTAF & CTAF): 9 models; 1314 to 37325 cfm.

REPLACEMENT HOUSING: **#28** d-h SPASAVER: kit to modernize on-job unit coolers.

Want literature? Request by number: **#1** *thru* **#28** __________

NAME __________

ADDRESS __________

d-h SINCE 1910

drayer-hanson
DIVISION OF NATIONAL-U.S. RADIATOR CORP
3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA
CABLE: FORTRADE: LOS ANGELES

MEETINGS & CONVENTIONS

Continued

1957

NOV. 16-18—*Air-Conditioning and Refrigeration Wholesalers Association*, annual meeting. Morrison Hotel. Chicago. Information: 2607 N. High St., Columbus, Ohio.

NOV. 16-19—*Refrigeration Service Engineers Society*. Morrison Hotel, Chicago. Information: 433 N. Waller Ave., Chicago 44.

NOV. 18-19—*National Air Pollution Control Association*, semi-annual technical conference. Fairmont Hotel, San Francisco. Information: 4400 Fifth Ave., Pittsburgh 13.

NOV. 18-19—*Refrigeration and Air Conditioning Contractors National Association*, annual convention. Drake Hotel. Chicago. The association is at 10660 Carnegie Ave., Cleveland 6.

NOV. 18-20—*National Heating and Airconditioning Wholesalers, Inc.* Morrison Hotel, Chicago. Information: 1200 W. Fifth Ave., Columbus 12, Ohio.

ALLIED
TRAINING IN
AIR CONDITIONING
and *REFRIGERATION*

Plan 1 100 HOURS

Intensive training in our fully equipped modern training shops and laboratory. Student receives practical instruction in Service, Repair and Installation on all types of equipment. Learn-By-Doing job experience supplemented by Training Films and classroom demonstration.

Plan 2 HOME TRAINING

Instruction designed by Allied Institute engineering staff with the cooperation of leading manufacturers in the Air Conditioning and Refrigeration industries. Hundreds of detailed illustrations supplement text material. Trainee may attend two weeks resident training at no additional tuition charge.

For more than a quarter of a century Allied's specialized training has received universal approval as a service to American industry. Write today for free descriptive catalog and detailed information about the above Plans. **Special attractive terms for the Industrial Sponsorship Plan.**

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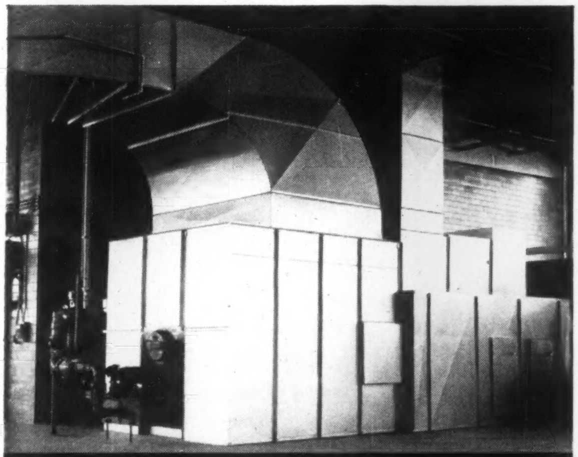
Chicago, Ill.



Jackson & Church furnaces

solve difficult heating problems of new Crown Cork and Seal plant —

INSTALLATION DATA

PLACE:

New lithograph plant of Crown Cork & Seal Company's Can Division, Philadelphia, operating five of the latest litho presses and five coaters and ovens

REQUIREMENTS:

Dependable heating designed to supply large volume of fresh outside air replacing oxygen consumed by lithograph equipment. Summer air conditioning to utilize same ducts and fans

HEATING UNITS SPECIFIED:

Three JACKSON & CHURCH GA-4750 units, having a total air delivery of 120,000 C.F.M. and 14,250,000 Btu input

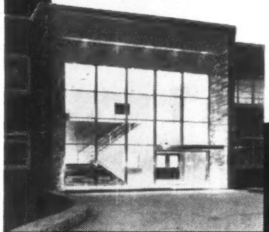
MANUFACTURER:

JACKSON & CHURCH - Div. of YORK-SHIPLEY, INC. York, Pa. (J-C furnaces - America's largest & most complete warm air heating line)

DISTRIBUTOR:

Furnace Distributors, Inc.
Philadelphia, Pa.

INSTALLER: Consolidated Air Conditioning



Modern facade' of Crown Cork & Seal Company's new plant in Philadelphia.

J-C

JACKSON & CHURCH
Division of
YORK-SHIPLEY, INC.
P.O. BOX 349, YORK, PENNSYLVANIA

PROPELLAIR®

...built to solve your "heavy duty" ventilating problems

...mount in any position

Heavy duty Propellair Type "CD" fans are designed for versatility and rugged duty. They can be mounted in side walls, roof ventilators, hoods, ducts and machinery in any position you require. They are ideal for "tough" ventilating jobs like removing heat, moisture, smoke and dust laden air. You get greater efficiency and quieter operation, because the exclusive venturi entrance ring prevents wasteful recirculation. The rigid, cast aluminum, precision balanced air-foil propeller runs quieter and retains its clean aerodynamic characteristics at all operating pressures. Powered by dependable Robbins & Myers Motors of any design you need, they are covered by a single name-plate guarantee. Available in sizes from 12" to 60" for from 1020 to 85000 CFM air delivery. Let Propellair engineers survey your needs and recommend the correct ventilating equipment.

WRITE FOR BULLETIN NO. 690 HP

R&M **PROPELLAIR**®

DIV. OF ROBBINS AND MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings PFMA

MAN COOLER

SKY-BLAST

VANEAXIAL

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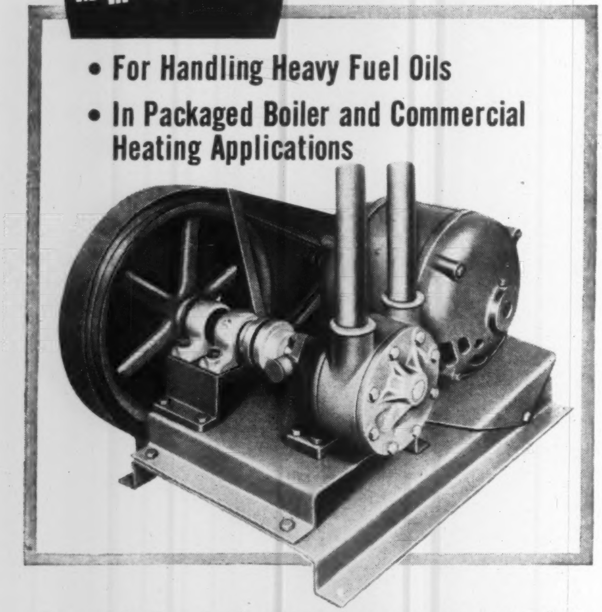
EXTENDED SHAFT

MOVING AIR IS OUR BUSINESS

new
TUTHILL
SU
PUMP UNIT

- For Handling Heavy Fuel Oils
- In Packaged Boiler and Commercial Heating Applications

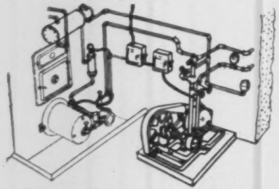


Economically priced, TUTHILL'S SU PUMP UNIT has been specifically developed for handling heavy fuel oils in commercial heating applications and with packaged boilers.

This "v" Belt Driven Unit is compact—complete units measure only 24¼" x 14⅝". Quiet operation is insured by the 2 or 4 "v" Belt Drive and the integral gear positive displacement pump design.

Construction features which provide dependable trouble-free operation, lower maintenance costs, include two ball bearing pillow blocks, one point take-up for simple adjustment of belt tension, removable belt guard and new fabricated steel base with versatile motor mounting.

SU PUMP UNITS can be furnished with a wide variety of pumps and motors for pressures up to 300 psi, capacities to 2030 gallons per hour. Sub-assemblies of pump, stub shaft, pillow block and sub-base are also furnished separately as a unit for incorporation into systems by boiler and furnace manufacturers. Write today for complete information.



Typical Application of SU Unit

TUTHILL PUMP COMPANY
947 East 95th Street, Chicago 19, Illinois
Gentlemen:
Please forward Catalog describing Tuthill SU Pump Units.
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TITLE__________
STREET__________
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TUTHILL PUMP COMPANY
947 East 95th Street, Chicago 19, Ill.
Canadian Affiliate: Ingersoll Machine & Tool Company, Ltd., Ingersoll, Ontario, Canada

PUMPS FOR YOUR PURPOSE

MEETINGS & CONVENTIONS

Continued

1957

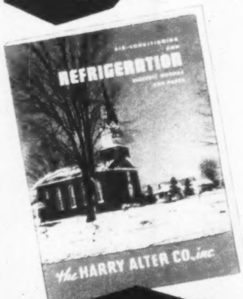
NOV. 18-21—*10th Exposition of the Air-Conditioning and Refrigeration Industry.* International Amphitheatre, Chicago. Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. (See pages 150-158 in this issue for list of exhibitors.)

NOV. 18-21—*National Association of Practical Refrigeration Engineers.* Del Prado Hotel, Chicago. Information: Nick Downs, chairman, 435 N. Waller Ave., Chicago 44.

NOV. 21-22—*National Warm Air Heating and Air Conditioning Association,* committee meetings and annual convention. Morrison Hotel, Chicago. NWAHACA headquarters: 640 Engineers Bldg., Cleveland 14.

DEC. 4-5—*Building Research Institute,* research conference. Shoreham Hotel, Washington, D. C. Information: Harold Horowitz, technical secretary, Building Research Institute, 2101 Constitution Ave., Washington 25, D. C.

We're Specialists In
Refrigeration
Air Conditioning
Electric Motors, Too!



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SAVE MONEY,
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Free Parking and Fast Counter Service at these 4 Big Houses

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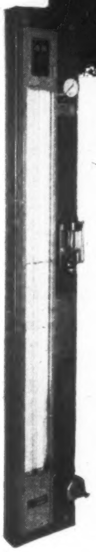
SERIES 1400

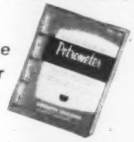
LIQUID DEPTH GAUGES



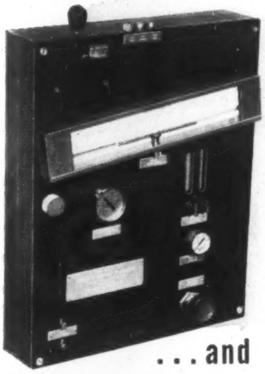
ACCURATE and EASY TO INSTALL

Available in 4 Models, Petrometer Series 1400 Tank Gauges operate on the sound principle of hydrostatic pressure. No moving parts, no expensive electrical or electronic equipment. Large vertical scale gives accurate, easy-to-see reading. And construction features make installation easy.

For complete information send for Bulletin 6004



Ask about our "Built-it-Yourself" Panel Systems



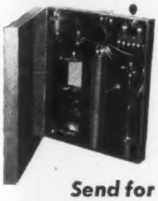
Measure Specific Gravity Accurately!

...and from a remote point

The Petrometer remote reading Specific Gravity Indicator is accurate to .001 Sp. G. unit, with interpolation to .0005 unit! It's easy to install . . . and operates on the simple, sound principle of a differential bubbler.

An ideal instrument for plant or laboratory for measuring specific gravity of any liquid . . . paints, fuel, resins, pharmaceuticals, chemical solutions.

All functional parts are conveniently mounted on rear of panel, accessible by swinging open the cabinet door.



Send for Bulletin 7004

Petrometer
CORPORATION
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NOTICE

REGARDING U. S. PATENT 2355966

U.S. Patent 2355966 covers the Z-Crete system of insulating underground hot pipes. Millions of feet of trouble-free, efficient, permanent Z-Crete have been installed throughout the world by licensed applicators under the patent.

The success of this patented system, however, spawned numerous imitators, and led to confusion among specifiers and users of underground insulation.

In order to protect engineers, contractors and owners, Zonolite Company found it necessary to go to the courts and test the validity of its patent on Z-Crete.

The United States Court of Claims' decision (April 3, 1957) ruled the patent valid and infringed. A favorable decision in a subsequent civil suit in the United States District Court in Maryland (July 18, 1957) reaffirmed the scope of the patent.

The successful adjudications of the Z-Crete patent allows Zonolite Company and its licensees to continue their intensive research program, which has already led to vastly improved results in underground hot pipe insulation, making today's Z-Crete the finest system available.

If you'd like the latest data on Z-Crete underground conduit systems, please send for brochure Z-1.

Z-CRETE Division

ZONOLITE COMPANY

Dept. HP-117, 135 S. LaSalle Street
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KEEPS AIR OR GAS OUT OF LIQUID LINES AND VESSELS

TROUBLE-FREE
HEAVY DUTY
V. D. ANDERSON

● Anderson Air Release Valves vent air or gas from any liquid line or vessel. Use them to release air from water systems, filters and tanks. Also, ideal for venting air and gases from oil, brine or other liquids. Special cast metal housing, corrosion resistant bronze valve and seat, and sturdy copper float assure long, trouble-free, leak-proof service.

BULLETIN 856 describes applications, gives complete specifications Write:

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ANDERSON
division of International Basic Economy Corporation

MEETINGS & CONVENTIONS

Continued

1957

DEC. 4-5—Third Annual National Construction Industry Conference. Congress Hotel, Chicago. Information: J. J. Kowal, conference secretary, Armour Research Foundation, 10 W. 35th St., Chicago 16.

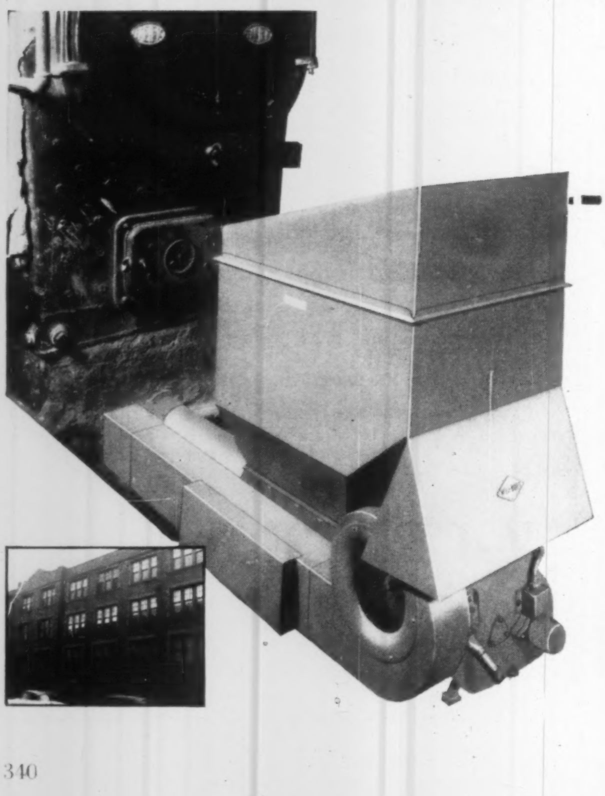
1958

JAN. 27-29—American Society of Heating and Air-Conditioning Engineers, Inc., 64th annual meeting. Pittsburgh. Information: A. V. Hutchinson, executive secretary, ASHAE, 62 Worth St., New York 13.

JAN. 27-30—1958 *Plant Maintenance and Engineering Show.* International Amphitheater, Chicago. Management: Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

FEB. 3-4—Instrument Society of America, national conference on progress and trends in chemical and petroleum instrumentation. Wilmington, Del. ISA headquarters: 313 Sixth Ave., Pittsburgh 22.

Performance Proves it...



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....fuel saving 25%!

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This Will-Burt Hopper Stoker Model is used in a large apartment in Chicago. Installed approximately one year ago it has already produced fuel savings of 25%!

Added benefits.. more uniform temperature control, less custodian supervision.

Air Controlled WILL-BURT STOKER

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THE WHITLOCK MANUFACTURING COMPANY
44 South Street, West Hartford 10, Conn.
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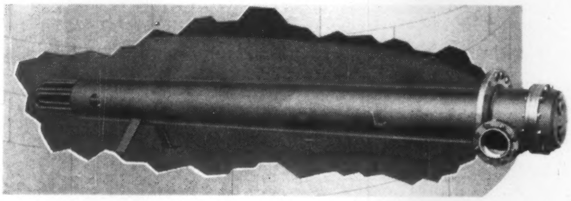
Whitlock Type V Heater for Fuel Oil

Ideally suited for industrial applications involving Bunker fuel oils. Preheats oil to promote efficient atomization and burning. Straight tube design for easy cleaning.

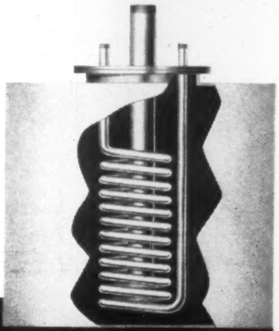


Whitlock Suction Heater for Fuel Oil

Recommended for heating heavy fuel oils to facilitate withdrawal from large storage tanks. Since only the oil within heater is heated, the need for heating entire tank is eliminated and heating costs lowered.

Whitlock Manhole Heating Unit

Designed for use on oil storage tanks. Low cost unit preheats oil to facilitate pumping. Easy to install . . . easy to maintain.



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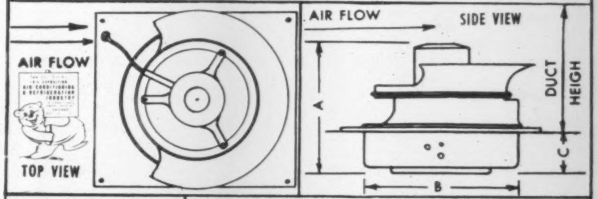
MORE COMPACT— INSTANT ACTION
HONEST HUMIDIFICATION FOR REAL WINTER AIR CONDITIONING
9

Walton has the only complete line of humidifiers—engineered to any type job. Technical information on how this equipment can be applied to your specific air conditioning problem on request.



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Send data on the in-duct humidifiers developed by Walton. Want more details on the product, the application, and how I can develop this new business. No obligation.

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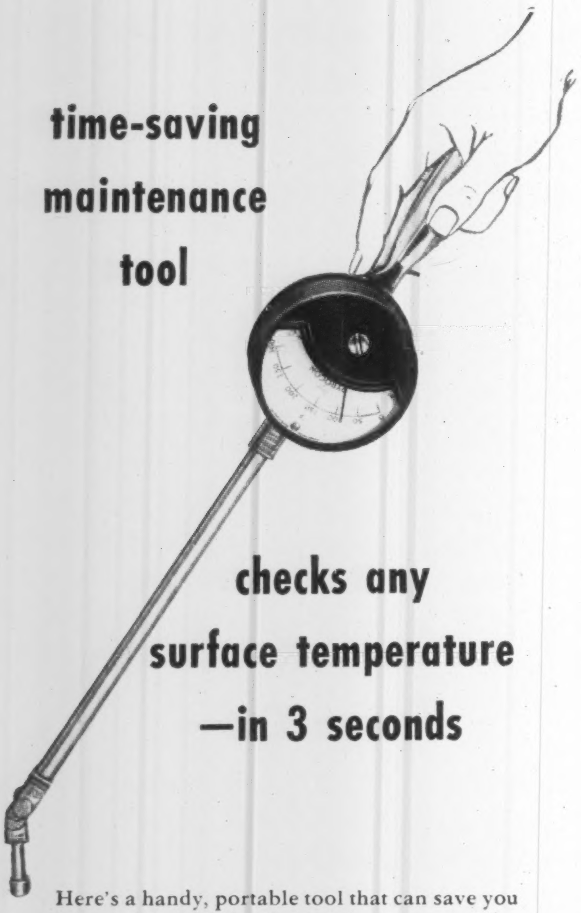
time-saving maintenance tool



checks any surface temperature —in 3 seconds

Here's a handy, portable tool that can save you hours of time in checking surface temperatures of steam traps, water lines, electric motors, bearings, etc.

The Alnor Pyrocon gives instant, accurate temperature readings of any surface: metallic or non-metallic, flat, curved—even revolving surfaces. It's a well-balanced instrument mounted in a sturdy case for protection against the usual hazards of on-the-job service. Jeweled movement is also heavy-duty, shock-resistant type that will withstand hard and continuous use... performing with laboratory accuracy.

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MEETINGS & CONVENTIONS

Continued

1958

FEB. 17-20—*Seventh Annual Industrial Ventilation Conference.* Kellogg Center, Michigan State University, East Lansing, Mich. Information: Industrial Ventilation Conference, Continuing Education Service, Michigan State University, East Lansing, Mich.

MARCH 17-21—*National Association of Corrosion Engineers,* annual conference and exposition. Civic Auditorium, San Francisco. NACE headquarters: 1061 M & M Bldg., Houston 2.

MARCH 17-21—1958 *Nuclear Congress.* International Amphitheater, Chicago. Information: Engineers Joint Council, 29 W. 39th St., New York 18.

MARCH 31-*APRIL* 2—*Gas Appliance Manufacturer's Association,* annual meeting. The Greenbrier, White Sulphur Springs, W. Va. GAMA headquarters: 60 E. 42nd St., New York 17.

MAY 4-7—*Air-Conditioning and Refrigeration Institute,* annual meeting. The Homestead, Hot Springs, Va. ARI headquarters: 1346 Connecticut Ave., N. W., Washington 6, D. C.

MAY 7-11—*Western Air Conditioning, Heating, Ventilating and Refrigeration Exhibit and Conference.* Shrine Exposition Hall, Los Angeles. Sponsored by Western Air Conditioning Industries Association. Information: Fred J. Tabery, exhibit manager, 3443 S. Hill St., Los Angeles 7.

MAY 11-14—*Fluid Controls Institute.* Lake Placid Club, Lake Placid, N. Y. Information: Fluid Controls Institute, Inc., P. O. Box 191, Decatur, Ill.

MAY 19-23—*National Fire Protection Association,* annual meeting. Palmer House, Chicago. The association is at 60 Batterymarch St., Boston.

JUNE 2-5—*National District Heating Association,* 49th annual meeting. French Lick-Sheraton Hotel, French Lick, Ind. Information: John F. Collins, secretary-treasurer, 827 N. Euclid Ave., Pittsburgh.

JUNE 9-13—*Fourth International Automation Exposition and International Automation Congress.* Col-

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CENTRIFUGAL BLOWDOWN SEPARATOR

SOLVES BOILER BLOWDOWN DISPOSAL PROBLEMS

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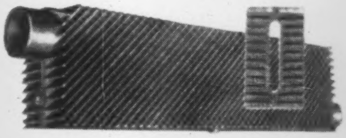
. . . provide maximum heat transfer with minimum weight. Rugged construction with high resistance to corrosion or electrolytic deterioration. You gain these advantages in Wilson Aftercoolers, Unit Heaters and other radiation products.



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NEW WEATHER RESET TIME SWITCH

OUTDOOR TEMPERATURE SELECTS COMFORT HEATING HOURS

Only the new Weather-Chron provides for independent comfort hour settings—separate for every day of the week!

WEATHER-CHRON EXCLUSIVES!

- Switching time to day-thermostat is automatically advanced with each degree drop in outdoor temperature.
- When outdoor temperature drops below the selected night dial setting, the day-thermostat controls heat flow at night as well as during the day.
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Available with 20 hours of spring carry-over

Each degree change in outdoor temperature automatically changes heating starts and stops.

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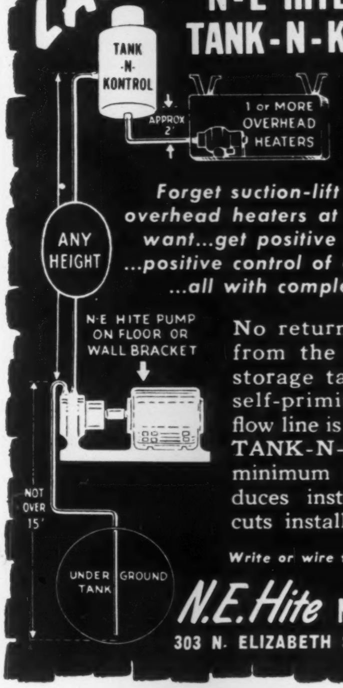
AT LAST! Now--you can raise oil ANY height

with the new, revolutionary, UL listed

N-E HITE PUMP and TANK-N-KONTROL Unit


TANK -N- KONTROL
APPROX 2'
1 or MORE OVERHEAD HEATERS
ANY HEIGHT
N-E HITE PUMP ON FLOOR OR WALL BRACKET
NOT OVER 15'
UNDER GROUND TANK

Forget suction-lift limits...mount your overhead heaters at any height you want...get positive trouble-free action ...positive control of oil level in tank ...all with complete safety features.

No return line is required from the pump to the oil storage tank. The pump is self-priming. And, no overflow line is necessary from the TANK-N-KONTROL. This minimum piping greatly reduces installation time and cuts installation costs.

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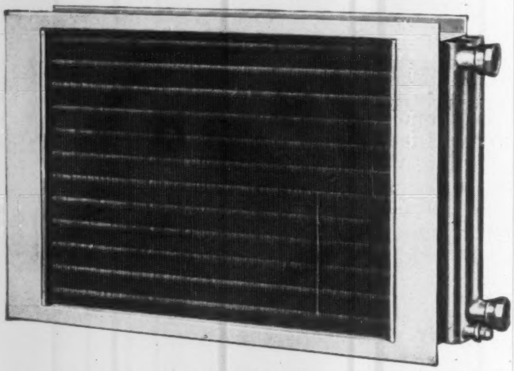
For Use in Combination With Air Conditioning Coils Or As Tempering and Booster Units in Long Heating Ducts.



Available in Single Row Type with BTU per hour capacity from 60,000 to 360,000. In Double Row Type, for heavy duty service, in capacities from 129,000 to 775,000 BTU per hour. Heavy gauge steel casings. Copper tubes and headers. Tested 350 lbs. air pressure for steam working pressures up to 125 lbs. Defroster-standard equipment. Also suitable for hot water.

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Complete facilities for fabrication of pipe coils—all types—all materials. Engineering service. Send details for price.

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PRECISION PNEUMATIC ATOMIZING NOZZLES

ACCESSORIES SUCH AS AIR FILTERS, HUMIDISTATS, SOLENOID VALVES, PRESSURE REGULATORS

COMPACT HUMIDIFYING UNITS

For industrial installations of every size Spraying Systems offers all needed equipment . . . everything but the piping, wiring and compressor. Provides high efficiency, dependable system; only two components have moving parts. Engineered for easy installation and simplified maintenance.

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ALSO SUPPLIED . . . spray nozzles for evaporative condensers, air washers, cooling towers, spray ponds and roof cooling systems.

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ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

MEETINGS & CONVENTIONS

Continued

1958

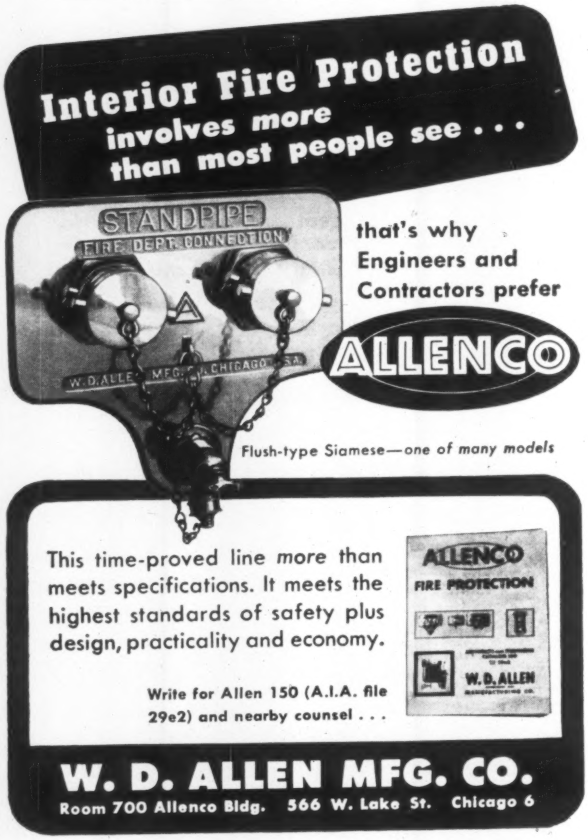
iseum, New York. Information: Richard Rimbach Assoc., 845 Ridge Ave., Pittsburgh 12.

JUNE 22-27—*American Society for Testing Materials*, annual meeting. Hotel Statler, Boston. Information: 1916 Race St., Philadelphia 3.

JUNE 23-25—*American Society of Heating and Air-Conditioning Engineers, Inc.* and *American Society of Refrigerating Engineers*, joint meeting. Hotel Leamington, Minneapolis. ASHAE headquarters: 62 Worth St., New York 13. ASRE headquarters: 234 Fifth Ave., New York 1.

OCT. 5-8—*National Association of Corrosion Engineers*, technical session. Hotel Somerset, Boston. NACE headquarters: 1061 M & M Bldg., Houston 2.

OCT. 12-16—*American Gas Association*, annual convention. Atlantic City. AGA headquarters: 420 Lexington Ave., New York 17.



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This time-proved line *more* than meets specifications. It meets the highest standards of safety plus design, practicality and economy.

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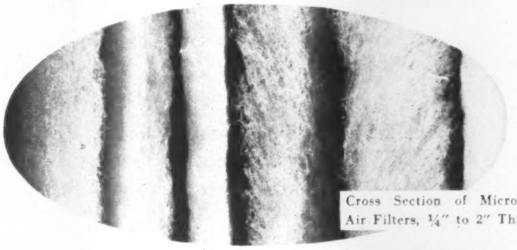
Micromat *replaceable*

Synthetic Fiber AIR FILTERS



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SAVE users up to 30% in maintenance costs!

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Require no oils, no washing—light, easy to handle, non-toxic. Micromat virtually eliminates spare filter storage problem!

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"ZIP-ON"
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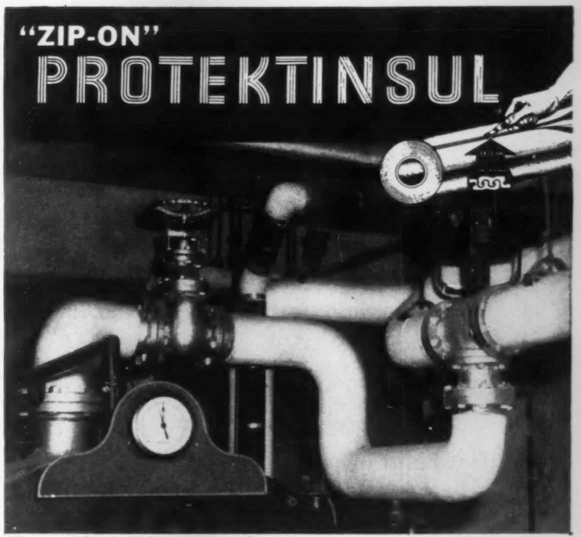

Miracle "Zip-On" Protektinsul Pipe Insulation Jacket installed in boiler room of Esso Bayway Community Center, Elizabeth, N. J.

Easy "Zip-On" installation ■ No maintenance painting ■ Excellent appearance ■ Non-inflammable ■ Chemical and mildew proof ■ Perfect vapor barrier.

FREE: Colorful, illustrated PROTEKTINSUL brochure, no obligation.

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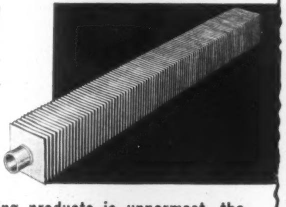
You Name It . . .

There's a G&O Finned Tube For Every Heating & Cooling Need

Users Have Named
G&O
"The Finest"



When quality in heating or cooling products is uppermost, the brand of finned tube that's uppermost in manufacturers' minds is G & O . . . famous for quality, excellence of design and construction, experience in engineering applications, fine workmanship and superior heating-cooling efficiency since 1915.

To improve your heating-cooling product of the future, write today for G & O literature on Finned Tubing in • straight lengths, U-bends, continuous return-bend coils, and special shapes for use in • heating coils, • unit heaters, • blast coils, • intercoolers, • after-coolers, • baseboard radiation, and • convector elements.

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New Formula **KEY-TITE** is easily applied, will not seize the joint, will not squeeze out.

Use **KEY-TITE** for the finest possible sealing of water, gas, low-pressure steam lines.

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Specified for cooling towers and other commercial and industrial applications.

Positive-action...high capacity...heavy and light duty service. Solid brass, chrome plated brass, nickel or stainless steel construction. Won't chatter, leak or drip. Outperforms any other Valve under the toughest service conditions.

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MEETINGS & CONVENTIONS

Continued

1958

OCT. 20-24—*46th National Safety Congress & Exposition*, Chicago. National Safety Council, 425 N. Michigan Ave., Chicago 11.

OCT. 22-24—*Air-Conditioning and Refrigeration Wholesalers Association*, annual meeting. Sheraton-Palace Hotel, San Francisco. Information: 2607 N. High St., Columbus, Ohio.

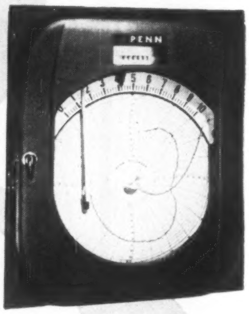
NOV. 17-21—*Society of the Plastics Industry*, eighth national plastics exposition. International Amphitheater, Chicago. SPI is at 250 Park Ave., New York 17.

DEC. 1-3—*American Society of Refrigerating Engineers*, semi-annual meeting. Hotel Roosevelt, New Orleans. Information: 234 Fifth Ave., New York 1.

DEC. 1-4—*National Warm Air Heating and Air Conditioning Association*, annual convention. Cleveland, Ohio. Information: 640 Engineers Bldg., Cleveland 14. #

When it's B/M "Matched Metering"

—you know it's accurate!



The high fidelity of Burgess-Manning Electric and Electronic Meters is made possible only by the Burgess-Manning null-balance inductance bridge, servo-powered meter principle employed. To this has been added the refinement of a calibrated cam, which matches the calibration of the recorder-totalizer and the differential producer for perfection thru "Matched Metering." Burgess-Manning electric transmission is suitable for distances up to 5000 feet. You'll never regret having specified Burgess-Manning "Matched Metering" for greatest overall accuracy.

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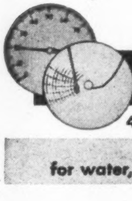
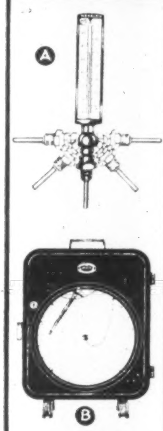


BURGESS-MANNING COMPANY
PENN INSTRUMENTS DIVISION
4108 Haverford Ave., Philadelphia 4, Pennsylvania

Instrumentation and Controls for water, steam, gases, sewage and industrial wastes

WEKSLER INSTRUMENTS

INDICATING AND RECORDING INSTRUMENTS FOR TEMPERATURE, PRESSURE AND HUMIDITY



A. INDUSTRIAL THERMOMETERS
Available in 5, 7, 9 and 12 inch case sizes in all ranges, metals and fittings, including patented Adjust-Angle. Request catalog 125A.

B. RECORDING THERMOMETERS
Vapor, liquid or mercury filled systems in 8, 10 or 12 inch chart sizes with 1 to 4 pens. Portable, wall or flush mounted. Request catalog 325A.

C. DIAL THERMOMETERS
In vapor, gas, liquid or mercury filled systems – 3½, 4½, 6 and 8½ inch cases of phenol, aluminum or brass. Request catalog 325A.

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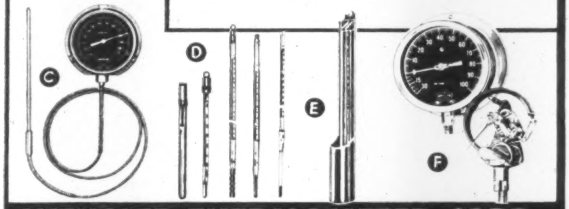
Laboratory grade, precision and to A.S.T.M. specifications. All types, sizes and ranges to meet all requirements. Request catalog 225A.

E. SCOOPMASTER TANK THERMOMETERS
14 inch chemical and heat resistant plastic cases. 120 ml cap. cup to A.P.I. and A.S.T.M. requirements. Request cat. 425A.

F. PRESSURE GAUGES
All standard ranges furnished in 3½, 4½, 6, 8½ inch cases. Cases are phenol, aluminum and brass for direct, wall or flush mounting. Request catalog 525A.



WEKSLER THERMOMETER CORP.
195 E. MERRICK ROAD, FREEPORT, L. I., N. Y.

Statement of Ownership and Management of
HEATING, PIPING & AIR CONDITIONING

for October 1, 1957

The following is a statement of ownership, management, etc., as required by the act of Congress of August 24, 1912, as amended by the acts of March 3, 1933 and July 2, 1946 (Title 39, United States Code. Section 233) of Heating, Piping & Air Conditioning, published monthly at Chicago, Ill., for October 1, 1957:

1. The names and addresses of the publisher, editorial director, editor, and president are:

Publisher, Chas. E. Price, Glencoe, Illinois.
Editorial Director, C. M. Burnam, Jr., Chicago, Illinois.
Editor, Robert W. Roose, LaGrange, Illinois.
President, Chas. E. Price, Glencoe, Illinois.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Keeney Publishing Company, 6 North Michigan Avenue, Chicago 2, Illinois. Stockholders: W. J. Osborn, Fairfield, Connecticut; Chas. E. Price, Glencoe, Illinois; Robert A. Jack, Cleveland Heights, Ohio.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

Chas. E. Price, President

Sworn to and subscribed before me this 19th day of September, 1957.

Lydia Thomas.
(SEAL) [My commission expires November 22, 1959]

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VALVE
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INDICATORS

HAND WHEELS FOR DIAL INDICATING

HAND REGULATING VALVES

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TEJAX ENGINEERING CORP.
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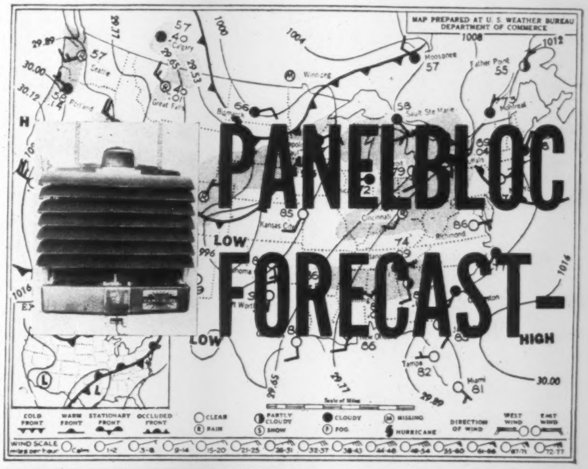

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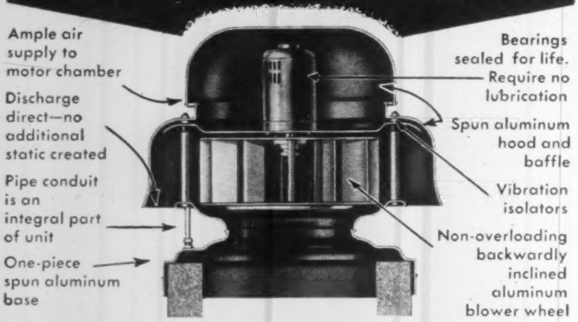
Canadian Affiliate: T. C. Chown, Ltd., Montreal - Toronto

All-Aluminum Cook Ventilators


Ample air supply to motor chamber
Discharge direct—no additional static created
Pipe conduit is an integral part of unit
One-piece spun aluminum base
Bearings sealed for life. Require no lubrication
Spun aluminum hood and baffle
Vibration isolators
Non-overloading backwardly inclined aluminum blower wheel

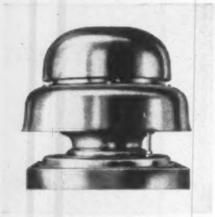
MODEL CD DIRECT DRIVE VENTILATOR
7" to 33" sizes (225 to 10,263 cfm)

All-aluminum construction decreases roof loads. Handsome low silhouette design is available in direct or belt drive. Light starting torque of aluminum blower wheel increases bearing and motor life (and belt life on belt drives). Non-sparking, non-overloading blower wheel.

Ratings in accordance with standard test code by Texas Engineering Experiment Station, an approved AMCA test lab.

Write for Catalog, or see Sweet's Architectural File.

In Canada write to H. F. Clarke, Ltd., 421 W. Broadway, Vancouver, B. C.



Same appearance in belt drive up to 13,939 cfm.

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LOREN COOK COMPANY
Berea, Ohio

NEW BOOKS & REPORTS...

Air Conditioning-Refrigeration Data Book—ASRE publication. 800 pp. American Society of Refrigerating Engineers, 234 Fifth Ave., New York 1. $10.00.

Thermodynamics of Heat-Power Systems—By F. W. Hutchinson. 490 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass. $8.50.

Elements of Heat Transfer—Third Ed. By Max Jakob and George A. Hawkins. 317 pp. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $6.75.

Handbook of Noise Control—By Cyril M. Harris. 1184 pp. McGraw-Hill Publishing Co., 327 W. 41st St., New York 36. $16.50.

Filler Metal Comparison Charts—AWS data sheet. American Welding Society, 33 W. 39th St., New York 18. $2.00.

New Lessons in Arc Welding—Second Ed. 320 pp. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17. $1.00. +

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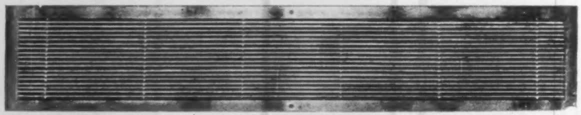

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Heating Engineers asked for a stronger, more durable grille — in harmony with the modern trend toward maintenance-free construction through greater use of Aluminum and Steel. Here's our answer: a Custom-Built Heavy-Duty Bar-Type Grille that provides long-needed protection against the trouble and expense so often caused by replacement of ordinary light-gauge grilles.
Available in any desired size or shape — All Steel or All Aluminum — for straight or deflected air flow. Bulletin 43 gives complete information. Write for free copy.

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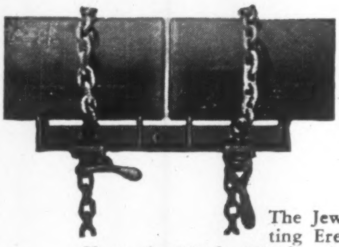
Los Angeles Area

PIPE WELDING CLAMPS THAT MAKE WELDING PAY



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TWO SIZES
½ to 8 in. 8 to 16 in.
Light—Adjustable—Fast

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Keeps the Welder Welding Instead of Waiting
CUTS ERECTION COSTS
Modernize Your Own Methods and Tool Equipment
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Roof ventilator manufacturer of nationally advertised gravity and power equipment desires contact with ambitious aggressive representative for choice protected U. S. territory. Prefer person or firm selling allied lines and contacting architect and engineer for specifications on a commission basis. State full particulars. Address Key 1330A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

REPRESENTATIVES WANTED

Leading manufacturer of nationally advertised Commercial Finned-Tube and Baseboard Radiation offers the most extensive line in the industry to qualified representatives. Revised marketing program has created additional openings in the following areas: S. California, Indiana, Illinois (excluding Chicago), Kentucky, Minnesota, Missouri, Ohio, Oregon, Washington, Carolinas, Western New York, Western Pennsylvania. Representatives must presently handle related heating items and include in coverage jobbers, contractors, engineers. The quality and superior features of the line coupled with competitive pricing present an unusually profitable arrangement for the right men. Reply in detail stating present lines, territory, other pertinent data. Replies confidential. Address Key 1324A, Heating, Piping and Air Conditioning, 6 N. Michigan Ave., Chicago 2, Illinois.

Manufacturers Agents in Chicago area wanted by manufacturer of nationally advertised heat exchange equipment. Manufacturer has complete line of transfer equipment, both shell and tube and water storage heaters. This line has good acceptance at both contractor and consulting engineer level. Address Key 1327A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Illinois.

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SALES ENGINEER — excellent opportunity with expanding specialty manufacturer of cast iron gas boilers for aggressive man with background in the wet-heat field, to call on jobbers, contractors, architects, builders, utilities. Able to organize sales meetings and render technical field service. Willing to travel and relocate. Applications held in strict confidence. Submit resume to Key 1323A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

We're giving the
United Way
How about you?

AGENTS WANTED

Distributors wanted for new revolutionary electric commercial radiant heater in all States. Write giving brief resume, including territory covered, organization and present lines handled. Address Key 1332A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

MANUFACTURER's REPRESENTATIVE — Sales and Service Engineer, 15 years experience, age 35, top sales record — managerial experience. Calling on industrials, commercial, governmental, institutions, architects, engineers, jobbers and contractors. Locating in San Francisco desires lines of established manufacturer for Northern California Territory, related to heating, cooling, air conditioning, refrigeration, boilers and hydraulic pumping equipment. Address Key 1331A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

ELI LILLY AND COMPANY

One of the Largest Manufacturers of Pharmaceuticals
Has Openings For

MECHANICAL ENGINEERS. Recent college graduates interested in estimating, designing and supervising the construction of heating, air conditioning and refrigerating systems and industrial service and process piping.

Forward resume to:

Personnel Requirements Department
220 East McCarty Street
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Exclusive Franchise. New "PACKAGED" Boiler Water Treatment. No Water Testing. Unconditionally Guaranteed. No investment required. C. C. MCMILLAN Industrial Water Treatment Chemicals, 3912 S. W. Dolph Ct., Portland 19, Oregon.

MISCELLANEOUS

IDENTIFICATION NAME PLATES for controls and panels — precision engraved on bakelite or black anodized alum. — any titles — quick service by mail on small or large jobs — send for sample and prices. ATLANTIC ENGRAVERS, INC., 52 Ocean Ave., Amityville, N. Y.

SITUATION WANTED

Graduate Sales Engineer. Six years experience. Age 27. $6500. Address Key 1329A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Illinois

LINES WANTED

Organization of sales engineers covering the five Western States desires association with rated manufacturer of air conditioning and associated equipment. If your product requires active application engineering, we can guarantee results. Address Key 1328A, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

SITUATION OPEN

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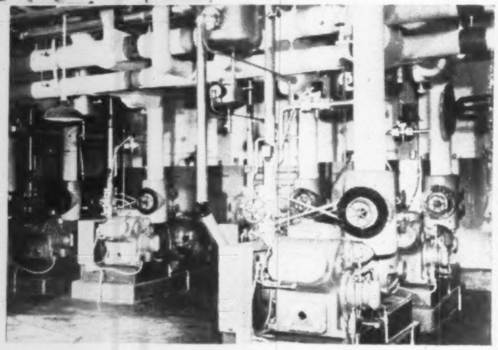
Sister Elizabeth KENNY Foundation

National Headquarters • Minneapolis, Minn.

Famous Neil House of Columbus, Ohio, chooses Vilter Air Conditioning to provide their guests with controlled comfort year 'round.



Shown are the five Vilter six-cylinder ammonia compressors which provide most of the refrigeration. Other Vilter equipment includes: evaporative condensers, Pakicer, for their ice requirements in kitchen and bottle beverage room service, shell and tube brine coolers to supply cold brine for the kitchen refrigerators and cold storage rooms, and air conditioning units. Complete automatic control is provided.

Famous Convention Hotel Enjoys VILTER Air Conditioning

● The Neil House, one of the outstanding convention hotels of the nation located in Columbus, Ohio, believes wholeheartedly in the drawing powers of air conditioning. A satisfied Vilter customer since 1939, it has continued, through the years, to extend its air conditioning facilities . . . Vilter units being specified in each case.

Prominent among Vilter equipment are the feature-packed VMC ammonia compressors which are installed in the power plant across the street—their compact design insures more capacity in less space . . . assure lower maintenance cost because of interchangeability of components . . . provide efficient, economical performance, guaranteed for a long life. Your refrigeration dollar buys more in a Vilter VMC.

Installed on the roof of the power plant are Vilter Evaporative Condensers. They save you 90 to 95% in water costs . . . provide low pumping costs, eliminate waste water disposal problems, and may be installed indoors or out. Vilter Evaporative Condensers mean lower cooling costs.

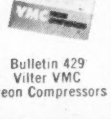
See your nearest Vilter distributor for engineering assistance in designing an air conditioning and refrigeration system to your needs.

See the Vilter Exhibit, Booth N. 136 at the ARI Show in Chicago, Illinois, November 18-21.

Write to The Vilter Manufacturing Company,
Dept. F-704, 2217 S. First Street,
Milwaukee 7, Wisconsin,
for helpful literature.

Bulletin 732
Vilter Evaporative
Condensers

Bulletin 631
Vilter
Uni-Chillers



Bulletin 429
Vilter VMC
Freon Compressors

Vilter®

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, Milwaukee 7, Wisconsin

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water & Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice & Polarflake Ice Machines

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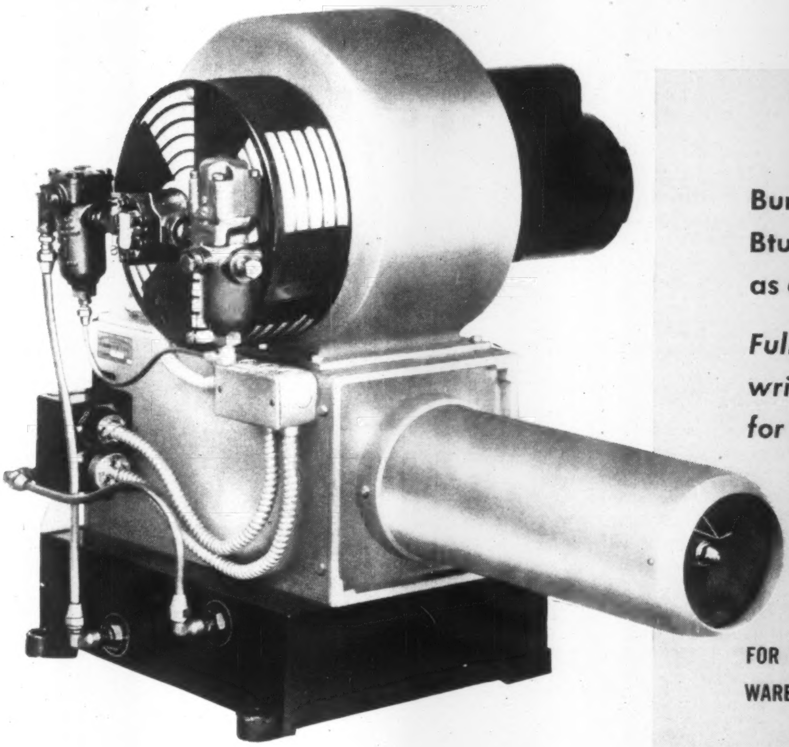
SUN-RAY
#5
OIL BURNER



Burns LOW COST, higher Btu #5 (and #4) fuel oil as efficiently as #2 oil.

Fully approved by Underwriters' Laboratories, Inc., for #5 oil.

CUTS FUEL BILLS

FOR FACTORIES, SCHOOLS, CHURCHES, WAREHOUSES, APARTMENT BLDGS., etc.

Read What Installers Say

OPERATORS HEAT, INC.
Baltimore, Md.

"I want to tell you about the field tests we have run on your #4 Oil Burner over the last fifteen months.

"Several things have stood out:

1. The Boilers have stayed much cleaner.
2. The Burners have been considerably quieter than the ones they replaced, whether light or heavy oil burners.
3. We noticed no difference in burning #4 and #5 oil except a little more pressure was used.

"Our service people and our customers are very happy about the operation of your heavy oil equipment."

Hollis Albert, President

NASSAU MUTUAL FUEL CO.
Hempstead, N. Y.

"Until approximately a year ago we installed nothing but rotary type #5 oil burners. Then, because it was impossible to install one in a particular job, we used our first Sun-Ray #5 Oil Burner.

"May I take this opportunity to thank you for putting out such a wonderful piece of equipment. Not only is it more economical and easier to install, but its efficiency, quietness and trouble-free service are beyond reproach.

"You can be sure we have installed Sun-Ray Burners since, and will continue to do so."

E. A. Werner, Jr., Vice-President

OIL BURNER UTILITY CO.
Woodside, N. Y.

"I would like to take this opportunity to compliment your company on your oil burner.

"Never having used any 4 or 5 oil equipment before, due to the service and installation problems of other units, I forfeited those sales in the past, until I tried one of your burners in July of 1956.

"Having found that the installation and service of your unit is comparable to a #2 oil burner, we began a campaign for this type of work. To date this has proved very profitable for us, with a nice increase in sales, oil gallonage and satisfied customers. We are frankly amazed at how little service these burners require and how well they work."

Max Hachmann

Get the facts on why it will pay you to specify and use #5 Burners.

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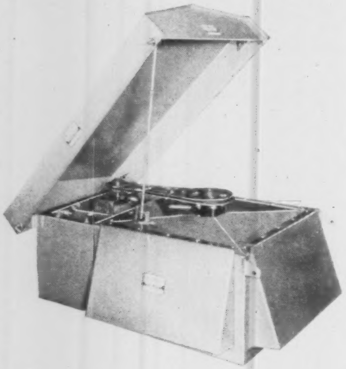
139-34 Queens Boulevard, Jamaica 35, New York

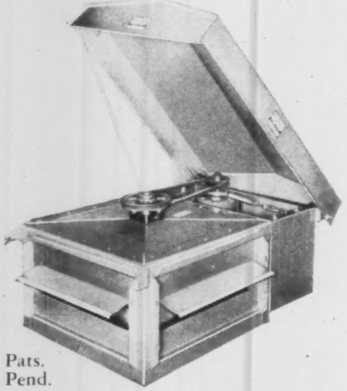
AirMpeler

LO-BOY

CENTRIFUGAL
ROOF EXHAUSTERS

Enchance The Beauty Of Building Skylines





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Lowest Silhouette Design

Forward or Backward Curve Wheel Within . . . . or Out of Scroll Housing

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

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SIZES 10"-72" 600-47,000
CERTIFIED C.F.M. RATINGS**

- **QUALITY** ● **BEAUTY**
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See Sweet's File 20c/Amm or Write for bulletin HA-100 57

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Minneapolis 1, Minnesota**
MEMBER OF THE AIR MOVING & CONDITIONING ASSN.

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HOW TO CUT APPLICATION COSTS

in Protecting Pipe and Pipe Joints Against Corrosion

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do the job without Kettles, Hot Stuff, or Special Crews

When specifications call for hot applied coal tar protection of underground piping as in AWWA specifications C-203 and C-204, and the volume does not justify the cost of shipment to a mill for coating—TAPECOAT offers a practical solution. Here is a widely-accepted alternate material that is equivalent to mill-applied hot coal tar protection.

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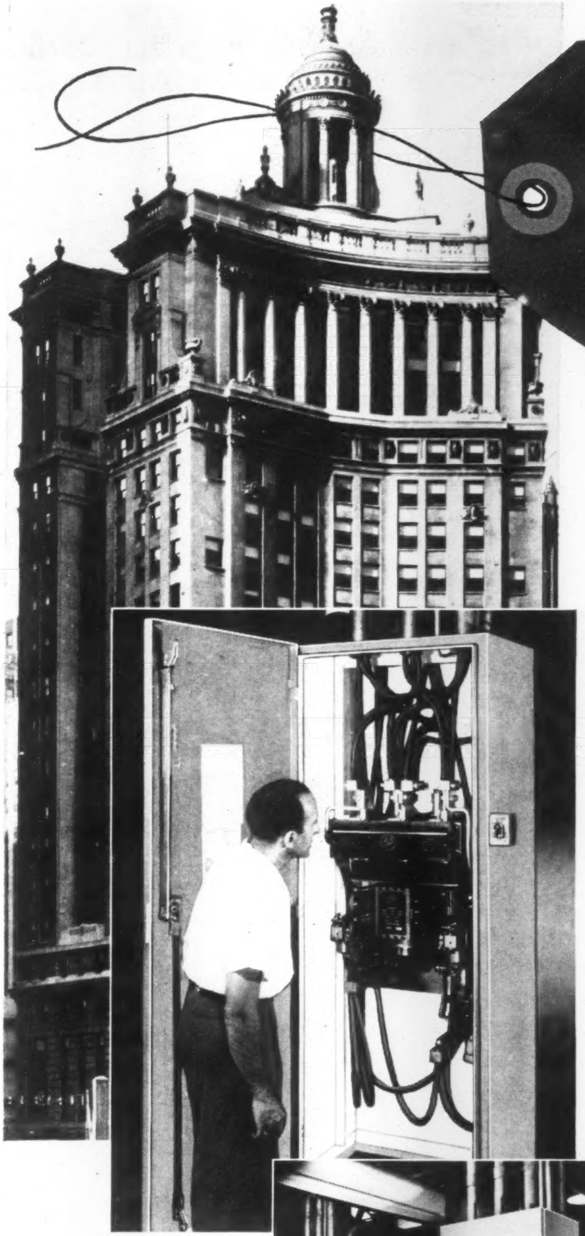
Equipped with trouble free ALLEN-BRADLEY MOTOR CONTROL



One of the Bulletin 709 Size 7 across-the-line starters used with the 250 hp, 208 v pump motors.

Trane's air-conditioning system in the London Guarantee Building, Chicago, uses Allen-Bradley solenoid motor control.

Manufacturers of large air-conditioning and refrigeration systems realize that the reliability of their system and the reliability of the motor control used are identical—for all practical considerations. That's why the Allen-Bradley trademark—the sign of quality motor control—is so frequently seen on important jobs.

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Please write for your copy of the latest Allen-Bradley Handy Catalog . . . the 132-page guide to trouble free a-c and d-c motor control.

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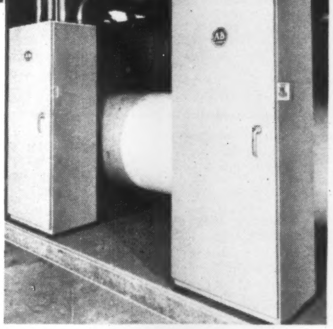
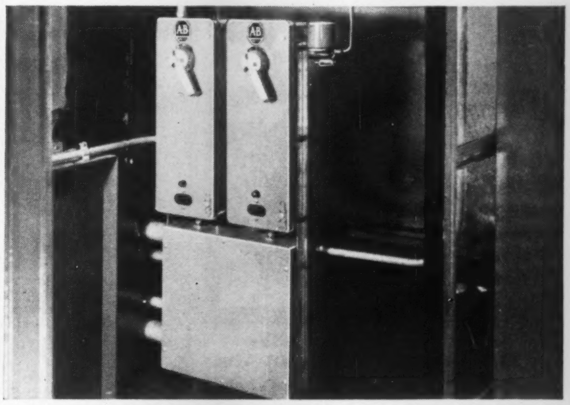


- The two Bulletin 709 Size 7 across-the-line starters for parallel pumps. Single or dual operation. Alternate starting is also provided.



- Zone air handling units are mounted on each floor in the elevator shaft. A set of two Bulletin 712 Size O combination starters—one for each intake and exhaust motor—are used with each of the 19 units in the building.

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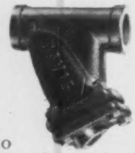

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Bolted cap "Y" Type Strainer for easy access for cleaning. Blowoff at lowest point—no sediment pocket! Complete range of sizes: ⅜" to 14"... available in semi-steel, bronze or steel bodies, screwed or flanged. Brass, stainless or monel screens. For steam, air, gas or fluids ... pressures to 1500 psi.

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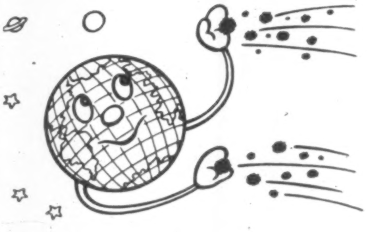
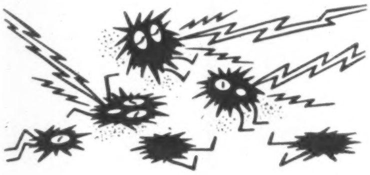
AIR-MAZING FACTS

BY O. SOGLOW



BIGGEST FILTER STOPS 20 MILLION METEORS A DAY! Only a few of the 20 million meteors heading our way each day ever hit the earth. For that, thank the 10-mile blanket of air that "filters" by burning up most of the meteor dust from outer space. And that's much the same kind of job that Air-Maze does in filtering out nuisance dirt from the air you breathe.



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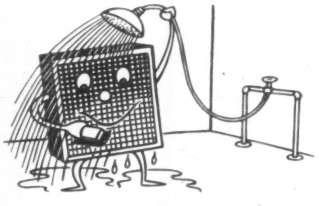

NEW FILTER CLEANS ITSELF! You don't have to clean an Automaze air filter. It cleans itself—*automatically!* Automaze's continuous belt of filter panels rotates through a cleaning tank where "pulse-type" action agitates each panel, removes the accumulated dirt. Goes 3 to 6 months without attention.

FOR AIR CONDITIONING AND VENTILATING EQUIPMENT, ENGINES, COMPRESSORS *or any device using air or liquids* — there is an Air-Maze filter engineered to solve each filtering problem. For new all-line catalog, write Air-Maze Corporation, Dept. D-2, Cleveland 28, O.

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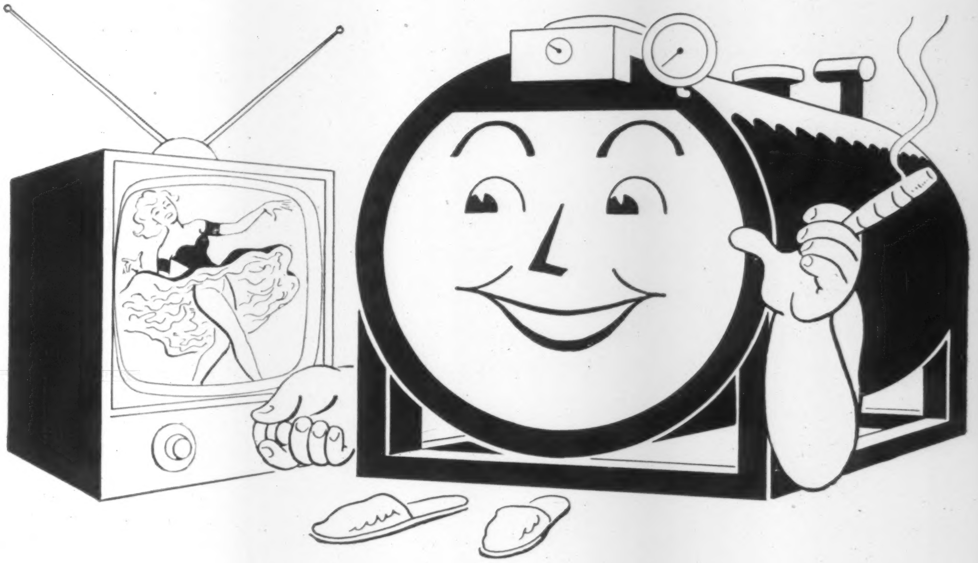

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Simplicity is the feature of the Continental Automatic Boiler.

Easy to install – a Continental Automatic Boiler is a completely integrated unit from one dependable source – not a collection of unrelated component parts expensively man-houred together.

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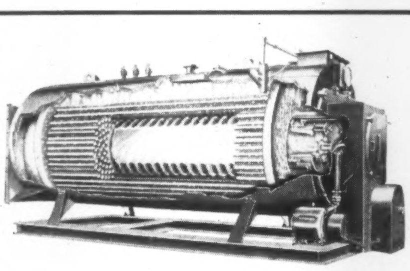
The Continental AUTOMATIC BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

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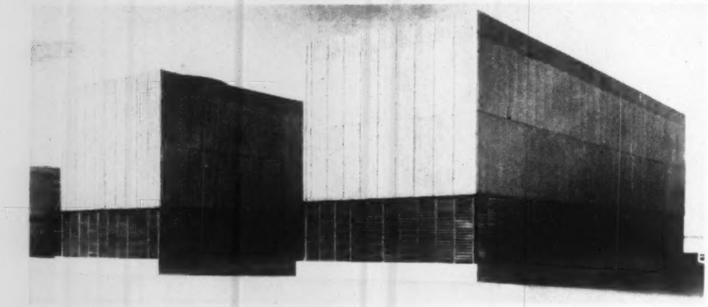
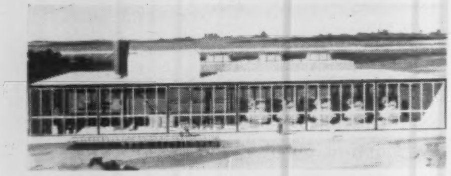


Pictured above is the largest cooling tower ever installed in New York on the world's largest absorption air conditioning system



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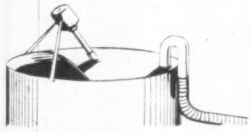

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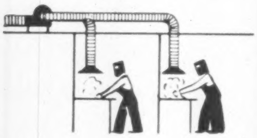

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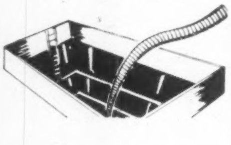

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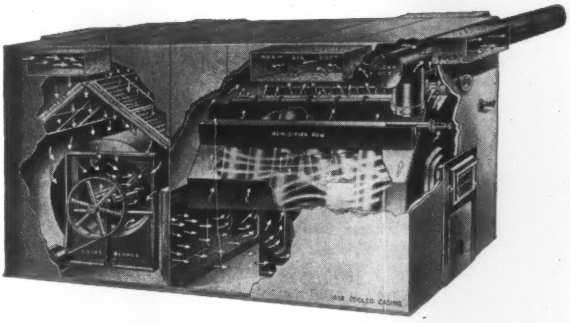

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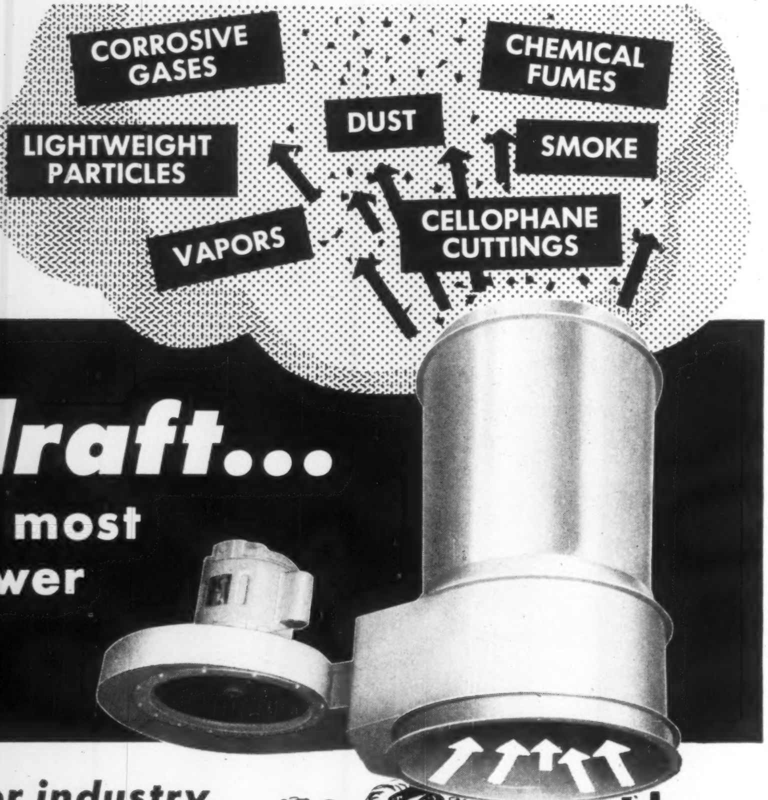

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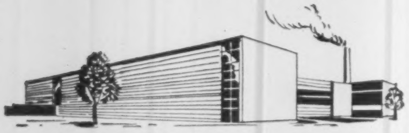

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FOR INDUSTRY, Quickdraft excels in venting paint booths . . . abrasives . . . corrosive gases . . . noxious fumes . . . high temperatures and moisture. Its blower operates in clean or outside air. It eliminates down-time for cleaning and replacing fan blades. It improves industrial venting and reduces maintenance costs!

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N-523-QD

Patent Num. 2,722,372.
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IMPORTANT NOTICE

In addition to standard acid resisting vitreous enamel finish, all Quickdraft units are available in No. 316 Stainless Steel or in rigid plastics such as P.V.C. Plastics and fiberglass coatings are also available for withstanding highly corrosive gases. With static pressures up to 12-inches, Quickdraft is ideal for materials handling applications.

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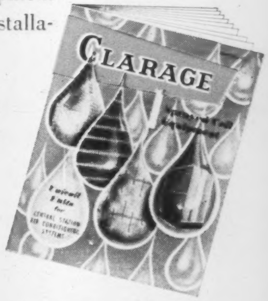

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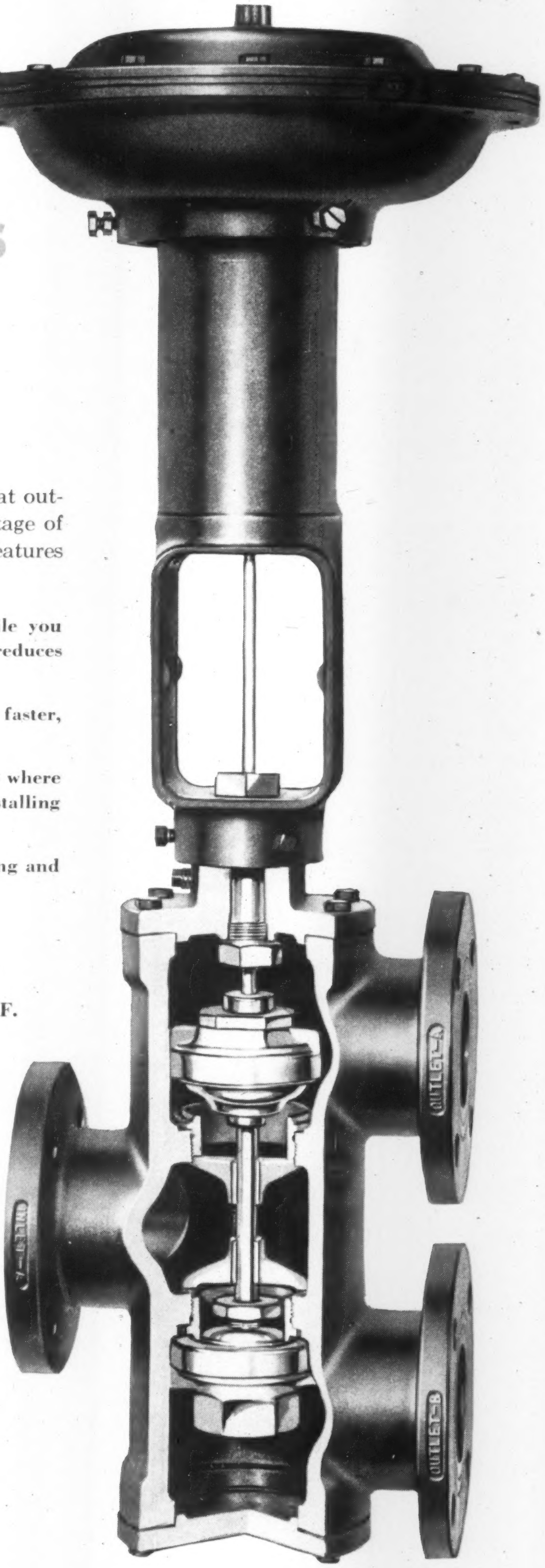City & State____________________